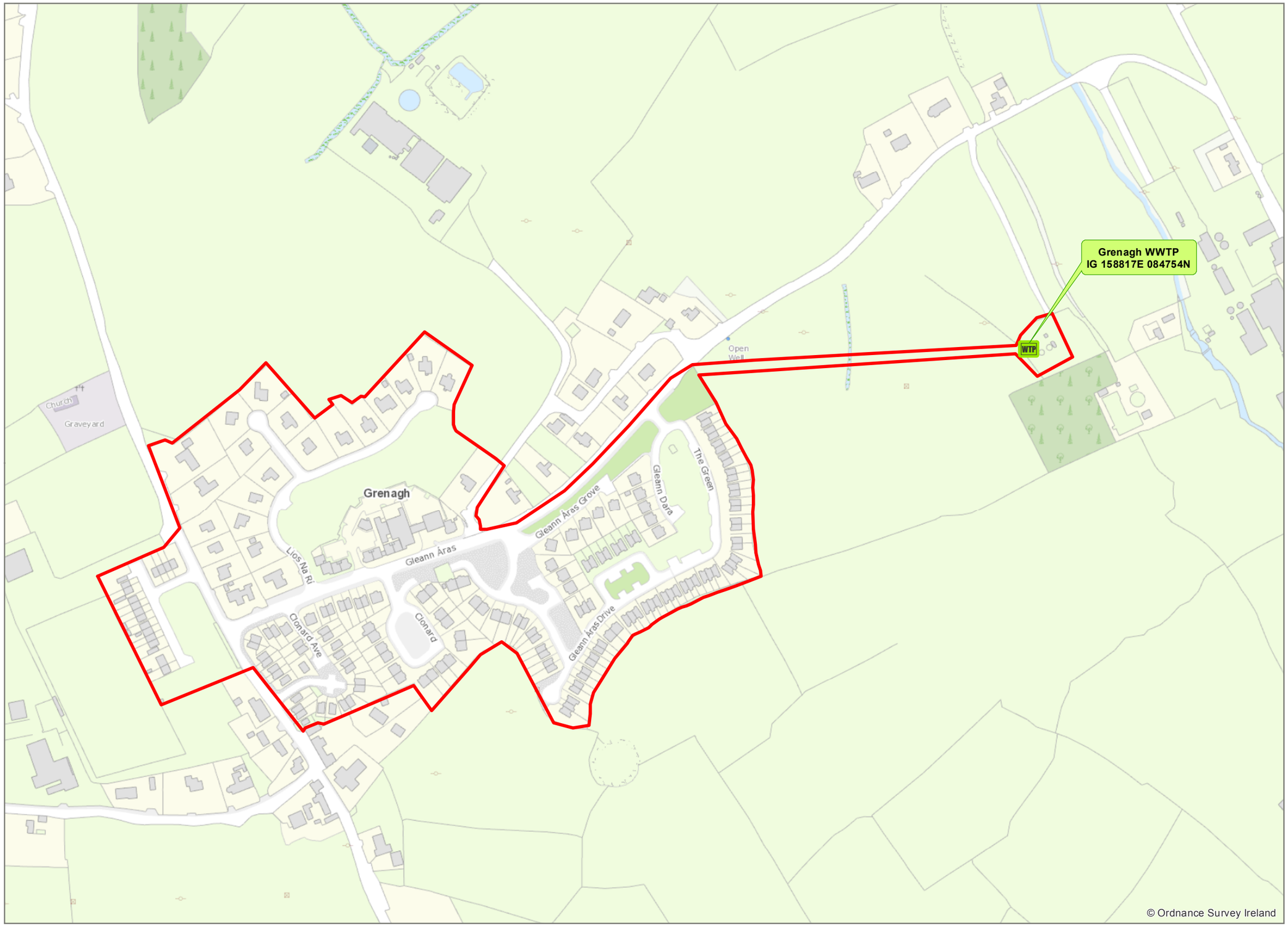
Attachment B1: Agglomeration Boundary

- **Attachment B.1: Agglomeration Boundary**



UISCE ÉIREANN : IRISH WATER

Legend

- WTP — Waste Water Treatment Plant
- IW Agglomeration Boundary

0 20 40 80 Meters

Coordinate System: TM65 Irish Grid
Projection: Transverse Mercator

Scale:	1:3,500 @ A3
Revision No.:	0
Attachment No.	B.1
Drawn By:	E.Laurinaviciute
Checked By:	V.McArdle
Approved By:	V.McArdle
Drawn Date	25/05/2017
Checked Date:	25/05/2017
Approved Date:	25/05/2017

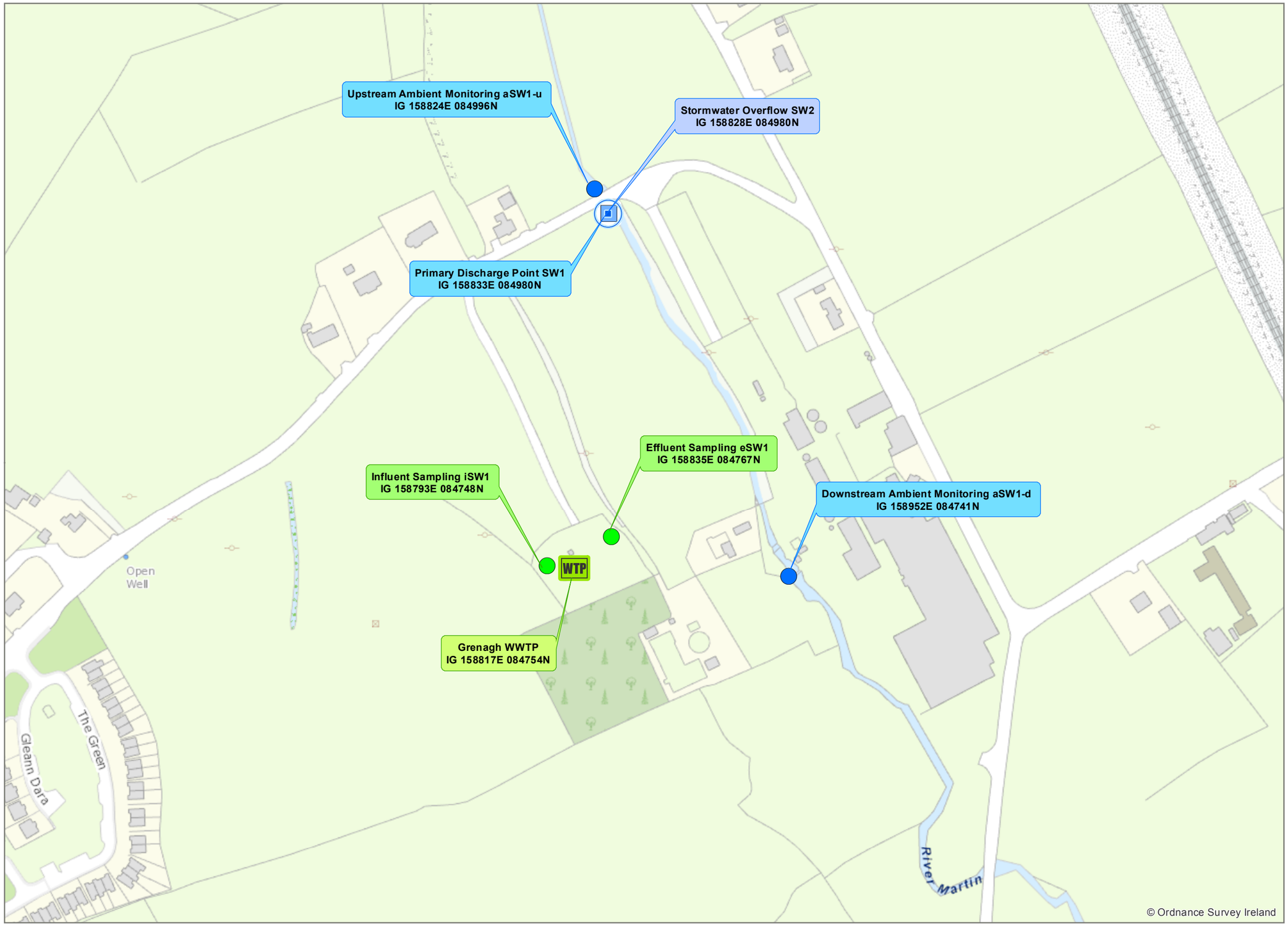
N

Map Template Design: kcarroll@water.ie

Agglomeration Boundary Grenagh

Attachment B3: Location of Primary Discharge Point

- **Attachment B.3: Primary Discharge Point and Sampling Locations Map**



UISCE ÉIREANN : IRISH WATER

Legend

- WTP — GrenaghWWTP
- Primary Discharge Point
- Ambient Sampling Location
- Effluent Sampling Location
- Influent Sampling Location
- Storm Water Overflow

0 15 30 60 Meters

Coordinate System: TM65 Irish Grid
Projection: Transverse Mercator

Scale:	1:2,500 @ A3
Revision No.:	2
Attachment No.	E.2
Drawn By:	L.Redmond
Checked By:	V.McArdle
Approved By:	V.McArdle
Drawn Date	20/06/2017
Checked Date:	20/06/2017
Approved Date:	20/06/2017

N

Map Template Design: kcarroll@water.ie

Grenagh WWTP, Primary Discharge and Sampling/Monitoring Locations

Attachment B6: Relevant Planning Authority

- **Attachment B.6: Record of Planning Permission**

Planning Application Details

Application Details

File Number:	983907
Local Authority:	Cork County Council
Engineering Area:	16
Planner:	hazel meaney
Name:	D. & J. BUILDERS (CORK LTD)
Development Address:	GRENAGH NORTH,
	GRENAGH NORTH,

Application Status

Date Received:	09/09/1998	Submissions By:	13/10/1998
Due Date:	02/03/1999		
Decision:	CONDITIONAL	Decision Date (MO):	26/02/1999
Application Status:	APPLICATION FINALISED		
Grant Date:	16/04/1999		

Application Type

Type:	PERMISSION
Development Description:	Residential development - 56 no. dwellinghouses & sewage treatment plant

Other Information

Further Info. Requested:	n/a
Further Info. Received:	n/a
Report File Location:	--
Functional Areas:	West Cork

Appeals to An Bord Pleanala

Number of Appeals:	1
Appeal Reference:	04.110725
Appeal Type:	THIRD PARTY
Appeal Date:	24/03/1999
Appeal Decision:	WITHDRAWN

Attachment B8: Notices and Advertisement

- **Attachment B.8(a): Public Notice**
- **Attachment B.8(b): Location for Public Notice Drawing**

CLASSIFIEDS

TELEPHONE 022 42394 EMAIL ads@corkman.ie

LEGAL NOTICES | LEGAL NOTICES | LEGAL NOTICES | LEGAL NOTICES | LEGAL NOTICES | LEGAL NOTICES | LEGAL NOTICES

PUBLIC NOTICE

APPLICATION TO THE ENVIRONMENTAL PROTECTION AGENCY FOR A WASTE WATER DISCHARGE LICENCE

Pursuant to Regulations 9 of the Waste Water Discharge (Authorisation) Regulations, 2007 (S.I. No. 684 of 2007), Irish Water, Colvill House, 24-26 Talbot Street, Dublin 1, intend to apply to the Environmental Protection Agency for a Wastewater Discharge Licence for the Grenagh waste water works. The waste water works was previously permitted as Certificate of Authorisation A0524-01. The waste water works consists of a wastewater treatment plant at 158817E 084754N, a primary discharge to the River Martin, 1 No. storm water overflow and associated sewer network. Details of the location of these works are as follows:-

Waste Water Works Item	Location (townland)	National Grid Reference
Wastewater treatment plant	Grenagh	158817E 084754N
Primary discharge (SW1)	Grenagh	158833E 084980N
Stormwater overflow (SW2)	Grenagh	158833E 084980N

A copy of the following documents shall, as soon as is practicable after receipt by the Agency, be available for inspection or purchase at the headquarters of the Environmental Protection Agency, P.O. Box 3000, Johnstown Castle Estate, Co. Wexford, at Irish Water, Colvill House, 24-26 Talbot Street, Dublin 1 and at the Water Services Department in Cork County Council Office, Floor 11, County Hall, Carrigrohane Road, County Cork.

(i) The application for a waste water discharge licence
(ii) Such further information relating to the application as may be furnished to the Agency in the course of the Agency's consideration of the application.

Submissions in relation to the application may be made to the Environmental Protection Agency at its headquarters at P.O. Box 3000, Johnstown Castle Estate, Co. Wexford.

PLANNING

CORK COUNTY COUNCIL: Folláin Teo are making an application to Cork County Council for Full Planning Permission for a 201.04kW Solar Photovoltaic (PV) Array to be mounted on the roof top of the existing food manufacturing building at Ballyvourney Industrial Estate, Ballyvourney, Co. Cork, Ireland. The Solar PV array will generate on site green electricity which will be used to help reduce the company's energy costs. The PV modules will cover 1199.06m2 of the Folláin Teo food manufacturing roof. The planning application may be inspected or purchased at a fee not exceeding the reasonable cost of making a copy at the offices of the Planning Authority, County Hall, Carrigrohane Road, Cork, during its public opening hours, i.e. 9.00a.m. to 4.00 p.m. Monday to Friday (excluding public holidays). A submission or observation in relation to the application may be made in writing to the Planning Authority on payment of the prescribed fee within the period of 5 weeks beginning on the date of receipt by the Authority of the application, and such submissions and observations will be considered by the planning authority in making a decision on the application. The planning authority may grant permission subject to or without conditions, or may refuse to grant permission.

PLANNING

CORK COUNTY COUNCIL: I, John Paul Edwards BEng. (Struct. Eng.) MIEI, on behalf of Dr. Deirdre Cotter wish to apply for permission at Oldcote Veterinary Clinic, Main Road, Ballincollig, County Cork P31HH24 for the construction of a commercial building (and associated signage) for a new veterinary clinic at rear of site on existing residential green area. Permission is also sought for the part demolition and removal of a commercial building housing existing veterinary clinic to facilitate the change of use from commercial to domestic use and for the construction of a new extension to the existing residential dwelling house. The development will also include change of use of part of commercial paved area at front and to the east side of the existing clinic to residential parking and residential green area. The planning application may be inspected or purchased at a fee not exceeding the reasonable cost of making a copy at the offices of the Planning Authority during its public opening hours and a submission or observation in relation to the application may be made to the Authority in writing on payment of the prescribed fee within the period of 5 weeks beginning on the date of receipt by the Authority of the application.

PLANNING

CORK COUNTY COUNCIL: We, Oliver Daly Architects, 6 Church Street, Castleisland, Co Kerry Tel. 066 7143604, intend to apply to Cork County Council for full planning permission to A) demolish existing rear outbuildings and part rear extension, B) construct rear extension, C) elevation changes to the front of the existing dwelling house, including internal alterations, D) change of use of ground floor garage area into living accommodation and all associated site works at Greenane Street Lower, Kanturk, Co Cork for John & Helen Corkery. The planning application may be inspected or purchased at a fee/ not exceeding the reasonable cost of making a copy at the offices of the Planning Authority during its public opening hours and a submission or observation in relation to the application may be made to the Authority in writing on payment of the prescribed fee within the period of five weeks beginning on the date of receipt by the authority of the application.

PLANNING

CORK COUNTY COUNCIL: Denis Quinn & Associates Architectural Design & Planning, Kiskeam, Mallow, Co. Cork 087)6275511 are applying on behalf of Rose Cottage Farms Ltd for permission to construct extension to existing cattle shed and all associated services & site works at Dromrastill, Lombardstown, Mallow, Co. Cork. The planning application maybe inspected or purchased at a fee not exceeding the reasonable cost of making a copy at the offices of the Planning Authority County Hall, Carrigrohane Rd., Cork during its public opening hours i.e. 9.00am to 4.00pm Monday – Friday excluding public holidays. A submission or observation in relation to the application may be made to the Authority in writing on payment of the prescribed fee within the period of 5 weeks beginning on the date of receipt by the authority of this application and any such observations will be considered by the planning authority in making a decision on the application. The planning authority may grant permission subject to or without conditions, or may refuse to grant permission.

PLANNING

CORK COUNTY COUNCIL Further information on Planning Reference 17/04936 by Kevin and Helena Quaid for retention of planning and full permission which now includes the proposal of a new effluent secondary and tertiary treatment system at Killeenleagh, Kanturk, Co Cork. Significant further information in relation to the application has been furnished to the Planning Authority and is available for inspection or purchase at a fee not exceeding the reasonable cost of making a copy,at the offices of the Authority during office hours and a submission or observation in relation to the further information may be made in writing to the Planning Authority on payment of the prescribed fee within 2 weeks of the date of receipt of the revised notice by the Planning Authority.

PLANNING

CORK COUNTY COUNCIL: We, John and Sean Angland, C/O Corroon Architectural Consultants, Chapel Lane, Mallow, (Tel: 022 23146) are applying for planning permission for retention of the existing underground slatted effluent storage tank and permission to construct a new bovine livestock slatted unit with 2 number underground effluent storage tanks and a new uncovered silage slab with all associated site and ancillary works at Barnacurra, Newmarket, Co.Cork. The application may be inspected, or purchased at a fee not exceeding the reasonable cost of making a copy, at the offices of the planning authority during its public opening hours and that a submission or observation in relation to the application may be made to the authority in writing on payment of the prescribed fee within the period of 5 weeks beginning on the date of receipt by the authority of the application.

PLANNING

CORK COUNTY COUNCIL: We Farm Design Solutions (087-9190830) wish to apply on behalf of Denis O'Sullivan & Joan O'Sullivan for permission for the construction of an extension to the north eastern elevation of existing agricultural building to include straw bedded livestock housing along with associated site works at Ballygirriha, Donoughmore, Co. Cork. The Planning Application may be inspected or purchased at a fee not exceeding the reasonable cost of making a copy at the offices of the Planning Authority during its public opening hours and a submission or observation in relation to the application may be made to the Authority in writing on payment of the prescribed fee within the period of 5 weeks beginning on the date of receipt by the Authority of the application.

PUBLIC NOTICE

APPLICATION TO THE ENVIRONMENTAL PROTECTION AGENCY FOR A WASTE WATER DISCHARGE LICENCE

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Waste Water Works Item	**Location (townland)**	**National Grid Reference**
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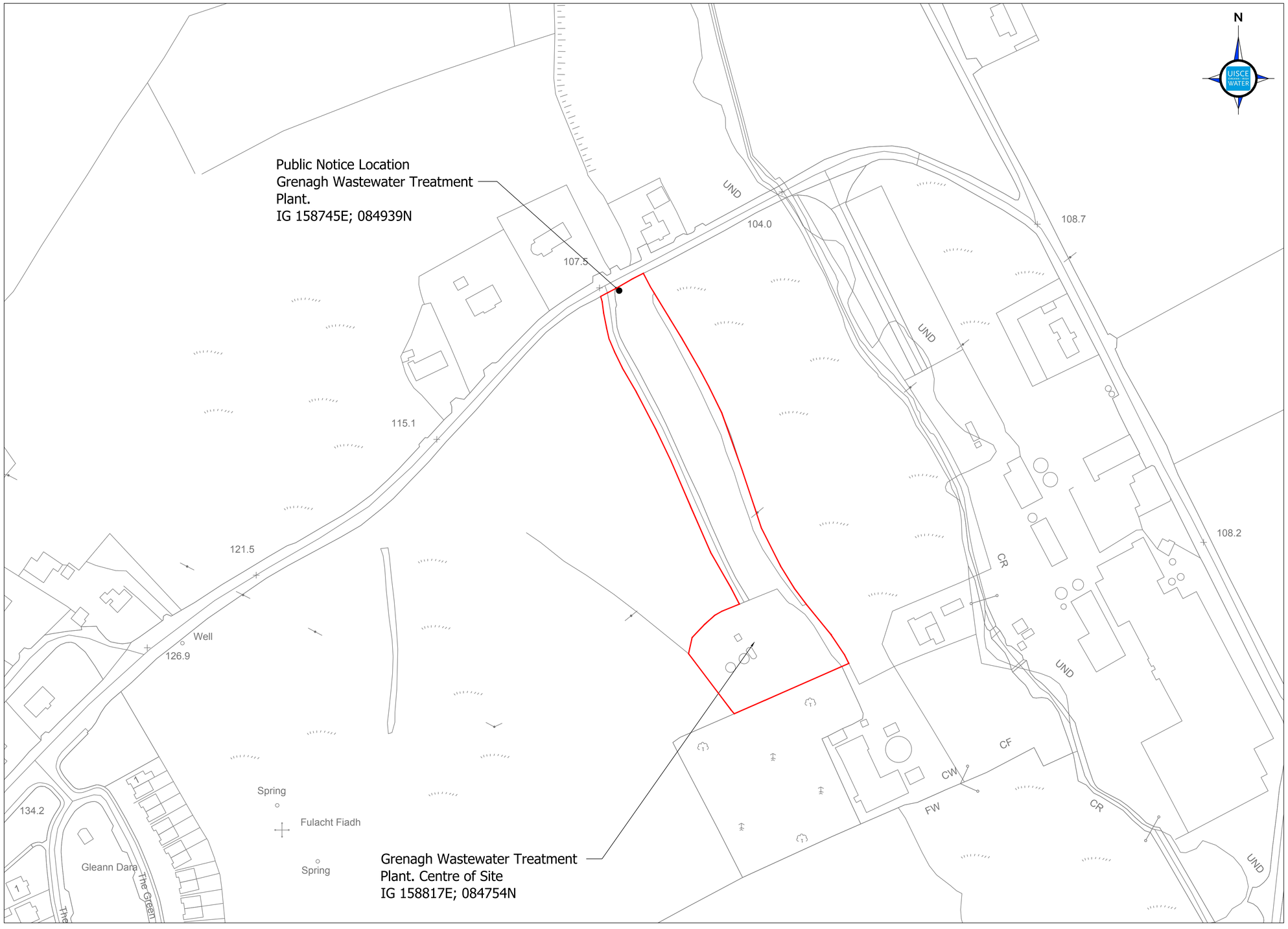
Primary discharge (SW1)	Grenagh	158833E 084980N
Stormwater overflow (SW2)	Grenagh	158833E 084980N

A copy of the following documents shall, as soon as is practicable after receipt by the Agency, be available for inspection or purchase at the headquarters of the Environmental Protection Agency, P.O. Box 3000, Johnstown Castle Estate, Co. Wexford, at Irish Water, Colvill House, 24-26 Talbot Street, Dublin 1 and at the Water Services Department in Cork County Council Office, Floor 11, County Hall, Carrigrohane Road, County Cork.

(i) the application for a waste water discharge licence
(ii) such further information relating to the application as may be furnished to the Agency in the course of the Agency's consideration of the application.

Submissions in relation to the application may be made to the Environmental Protection Agency at its headquarters at P.O. Box 3000, Johnstown Castle Estate, Co. Wexford.



UISCE ÉIREANN : IRISH WATER

NOTES:

LEGEND:

WWTP SITE Boundary

REVISIONS:

Drg: xxx	Chk: xxx	App: xxx	Date: dd/mm/yy	Status: Status

0 10 20 30 40 50 m

SCALE 1:1000

Coordinate System: TM65 Irish Grid
Projection: Transverse Mercator

SCALE:	1:1000 @ A1
DRAWING No.	IW_GRENAGH_001
REVISION:	0
Drawn By:	I Dawson
Checked By:	V McArdle
Approved By:	V McArdle
Status:	FINAL
Drawn Date:	12/06/2017
Checked Date:	12/06/2017
Approved Date:	04/08/2017

Grenagh Discharge License Application,
Location for Public Notice

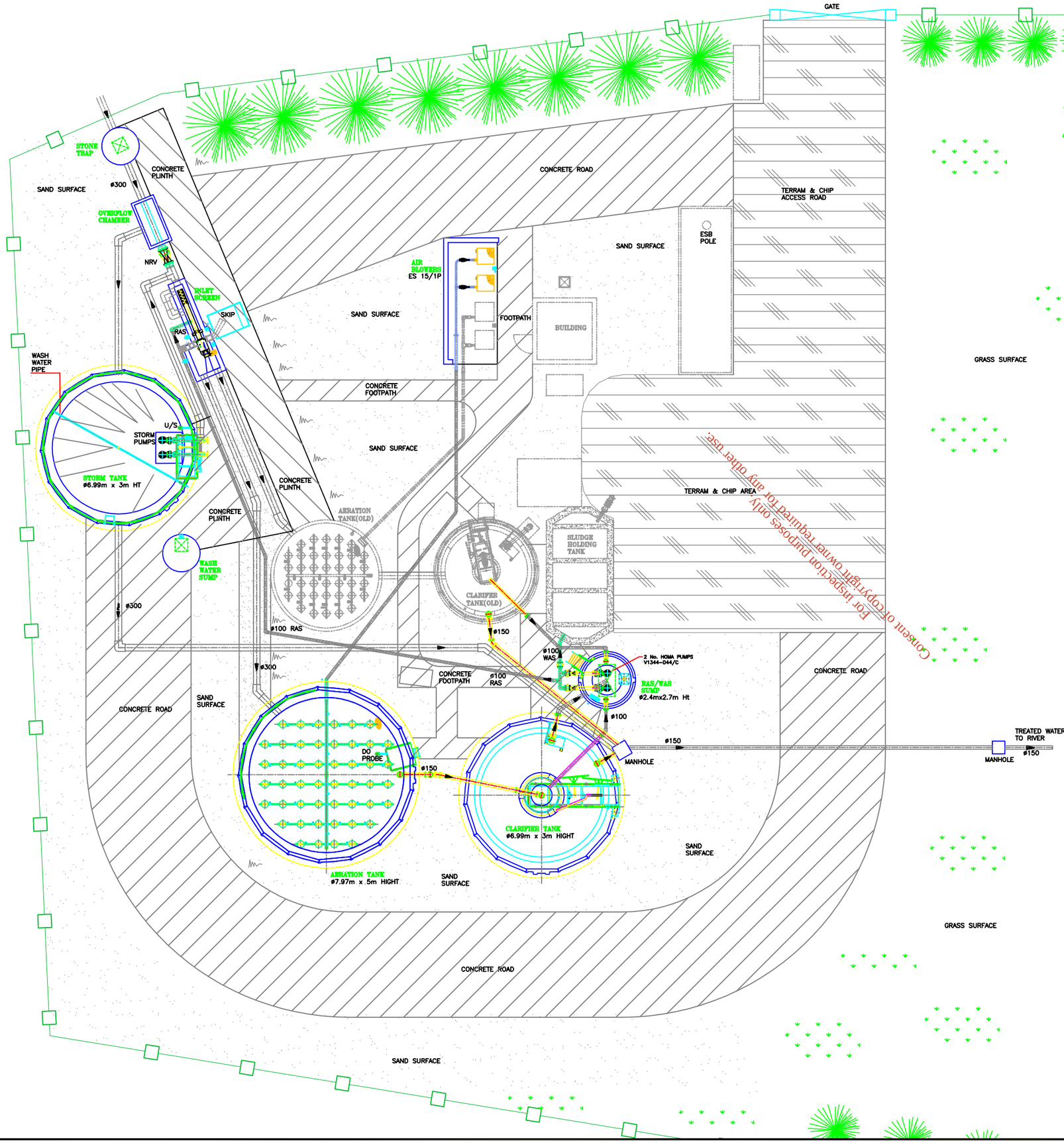
Titleblock CAD Design: idawson@water.ie
Titleblock GIS Design: kcarroll@water.ie

SECTION C – INFRASTRUCTURE & OPERATION

Attachment C1: Operational Information Requirements

- **Attachment C.1: WWTP Layout**

IF IN DOUBT ASK DO NOT SCALE OFF THIS DRAWING



REFERENCE DRAWINGS

DRAWING NUMBER:	REV.

SCHEDULE OF BUILDERSWORK OPES & LEVELS

Centerline of ope on plan equals centerline of corresponding pipe passing through unless noted otherwise.

Ref:	Pipeø	Size (W x H)	Invert Level	Qty.

HAZARDOUS ZONE RATINGS:

GENERAL NOTES:

1. All power ducts to be 150ø unless noted otherwise.
2. All telem ducts to be 100ø unless noted otherwise.
3. All power and telem ducts to be separated by a minimum distance of 725mm center to center where practical.
4. All pipe invert levels taken from underside of outside diameter unless noted otherwise.

Rev	Drn	Ckd	Apd	Date	Description
A	ST	JL	JL	15.12.09	AS BUILT

Drawing Status:
AS BUILT

Pumping & Treatment Systems
Industrial Estate, Quarterlands, Mallow, Co. Cork., Phone: 022-21200 Fax: 022-21290 Email: controls@epsireland.com
Ballyhaunis, Co. Mayo. Phone: 0907-30226 Fax: 0907-30761
Mountrath, Co. Laois. Phone: 0502-32379 Fax: 0502-32518

Contract:
GRENAGH WASTE WATER TREATEMENT WORKS UPGRADE

Client:
D & J BUILDERS

Consultant:

Drawing Title:
SITE LAYOUT & MAIN INLET WORKS

Scale: 1:100	Plot: A1 @ 1:1
Drawn By: AW	Date: 24.11.04
Revision Suffix: A	
Job No.: PC523	
Drg No.: PC523-01 SHEET 1 OF 2	
Workshop No.:	

SECTION D – DISCHARGES TO THE AQUATIC ENVIRONMENT

Attachment D1: Discharges to Surface Waters

- **Table D.1(i)(a): Emissions to Surface/Ground Waters (Primary Discharge Point)**
- **Table D.1(i)(b): Emissions to Surface/Ground Waters – Characteristics of the Emission (Primary Discharge Point)**
- **Table D.1(i)(c): Dangerous Substance Emissions to Surface/Ground Waters – Characteristics of the Emission (Primary Discharge Point)**

WWD Licence Application

Table D.1(i)(a): EMISSIONS TO SURFACE/GROUND WATERS (Primary Discharge Point)

Volume emitted m^3 (i)					
Normal/day	133.20	Maximum/day	415.13		
Maximum rate/hour	17.30		min/hr	hr/day	day/year
Dry Weather Flow/sec	0.0015	Period of emission (avg)	60.00	24.00	365.00

Current PE	592
Future PE	615

Table D.1(i)(b): EMISSIONS TO SURFACE/GROUND WATERS - Characteristics of The Emission (Primary Discharge Point)

1	pH	NT	
2	Temperature	NT	
3	Electrical Conductivity (@ 25 'C)	NT	
	Max. daily average per day	**(mg/l)**	**kg/day**
4	Suspended Solids	1.25	0.167
5	Ammonia as (N)	NT	
6	Biochemical Oxygen Demand	1.5	0.200
7	Chemical Oxygen Demand	10.5	1.399
8	Total Nitrogen (as N)	NT	
9	Nitrite (as N)	NT	
10	Nitrate (as N)	NT	
11	Total Phosphorus (as P)	NT	
12	Orthophosphate (as P)	NT	
13	Sulphate (SO4)	NT	
		(µg/l)	
14	Phenols	NT	

Note: max average determined based on 2016 effluent sampling data.

Normal Flow rate= 133.20

Table D.1(i)(c) : DANGEROUS SUBSTANCE EMISSIONS TO SURFACE/GROUND WATERS - Characteristics of The Emission (Primary Discharge Point)

D.1(i)(c) Primary Discharge – Dangerous Substances

Substance	Unit of Measurement	Sampling Method		Max dailyAvg.	kg/day
Atrazine	µg/l	Grab	<	0.01	1.332E-06
Dichloromethane	µg/l	Grab	<	5	0.000666
Simazine	µg/l	Grab	<	0.01	1.332E-06
Toluene	µg/l	Grab	<	0.54	7.193E-05
Tributyltin	µg/l	Grab	<	0	0
Xylenes	µg/l	Grab	<	0.7	9.324E-05
Arsenic	µg/l	Grab	=	0.699	9.311E-05
Chromium	µg/l	Grab	=	1.28	0.0001705
Copper	µg/l	Grab	=	154.8	0.0206194
Cyanide	µg/l	Grab	<	5	0.000666
Flouride	µg/l	Grab	=	270	0.035964
Lead	µg/l	Grab	=	5.126	0.0006828
Nickel	µg/l	Grab	=	3.865	0.0005148
Zinc	µg/l	Grab	=	220.1	0.0293173
Boron	µg/l	Grab	=	101.9	0.0135731
Cadmium	µg/l	Grab	=	0.161	2.145E-05
Mercury	µg/l	Grab	<	0.04	5.328E-06
Selenium	µg/l	Grab	=	2.12	0.0002824
Barium	µg/l	Grab	=	15.84	0.0021099

NEW FLOW RATE: 133.20

Note: The treated effluent from the existing WWTP was tested for dangerous substances listed in Water Quality (Dangerous Substances) Regulations, 2001 (S.I. 12 of 2001) in May 2012. The agglomeration consist largely of domestic properties, hence the influent discharged to the WWTP is not expected to have a significant industrial influence.

SECTION E – MONITORING

Attachment E1: Wastewater Discharge Frequency & Quantities – Existing

- **Table E.1(i): Waste Water Frequency and Quantity of Discharge Primary Discharge Points**
- **Table E.1(ii): Waste Water Frequency and Quantity of Discharge Stormwater Overflows**

TABLE E.1(i): WASTE WATER FREQUENCY AND QUANTITY OF DISCHARGE – Primary Discharge

Identification code for discharge point	Frequency of discharge (days/annum)	Quantity of Waste Water Discharged (m^3/annum)
SW1	365	48,618

TABLE E.1(ii): WASTE WATER FREQUENCY AND QUANTITY OF DISCHARGE – Storm Water Overflows

Identification code for discharge point	Frequency of discharge (days/annum)	Quantity of Waste Water Discharged (m^3/annum)	Complies with Definition of Storm Water Overflow
SW2	Unknown	Unknown	Yes

Attachment E4: Sampling Data

- **Attachment E.4: Effluent Sampling Data**

E.4 Effluent Sampling Data 2016-2017

Effluent Sampling Location eSW-1

Effluent - Regular Emissions

Water Management Unit	Sample Template	Sample Date	Sample Method	mg/l	mg/l	mg/l
				BOD	Chemical Oxygen Demand	Suspended Solids
				-	-	-
				-	-	-
River Martin	Effluent WWDL	28/01/2016	Grab	1.5	10.5	1.25
River Martin	Effluent WWDL	01/03/2017	Grab	-	43	6

SECTION F – EXISTING ENVIRONMENT & IMAPCT OF THE DISCHARGE(S)

Attachment F1: Assessment of Impact on Receiving Surface or Ground Water

- **Attachment F.1(a):** **WAC Calculations**
- **Attachment F.1(b):** **Screening for Appropriate Assessment Report**
- **Attachment F.1(i)(a):** **Upstream Ambient Monitoring Data – Regular Emissions**
- **Attachment F.1(i)(b):** **Downstream Ambient Monitoring Data – Regular Emissions**
- **Attachment F.1(ii)(A):** **Downstream Ambient Monitoring Data – Dangerous Substances**

Waste Assimilative Capacity (WAC) Calculation

WWTP	Grenagh					
Name of River	River Martin				**Allowable Concentration**	
WFD Water Quality (Good/High)	Poor	Data Source:	EPA WFD Website		**Good Status**	**High Status**
95% Flow (m3/s)	0.045	Data Source:	EPA Hydrotool		**95%ile mg/l**	**95%ile mg/l**
95% Flow (m3/day)	3888			Carbonaceous BOD	2.60	2.20
Mean Flow (m3/s)	0.281	Data Source:	EPA Hydrotool	Ammonia Nitrogen (NH)	0.14	0.09
Mean Flow (m3/day)	24278			Ortho Phosphate (OP)	0.075	0.450
Effluent					**Mean mg/l**	**Mean mg/l**
PE	592			Carbonaceous BOD	1.50	1.30
Effluent flow (m3/day)	133.2			Ammonia Nitrogen (NH)	0.065	0.040
Dilution @ 95%ile flows	29.2			Ortho Phosphate (OP)	0.035	0.025
Dilution @ mean flows	182.3					

95%ile River Flows

Parameter	Background Concentration mg/l (Notionally Clean)	Effluent Standards	Contribution from Primary Discharge (mg/l)	Resultant Concentration (Notionally Clean)	Allowable Concentration 95%ile mg/l	% of Available WAC
Carbonaceous BOD	0.260	25.00	0.83	1.079	2.60	35%
Ammonia Nitrogen (NH)	0.008	7.30	0.24	0.250	0.14	183%
Ortho Phosphate (OP)	0.005	3.30	0.11	0.114	0.075	156%

95%ile River Flows

Parameter	Background Concentration mg/l (Actual)	Effluent Standards	Contribution from Primary Discharge (mg/l)	Resultant Concentration (Actual)	Allowable Concentration 95%ile mg/l	% of Available WAC
Carbonaceous BOD	0.500	25.00	0.83	1.312	2.60	39%
Ammonia Nitrogen (NH)	0.025	7.30	0.24	0.266	0.14	210%
Ortho Phosphate (OP)	0.017	3.30	0.11	0.126	0.075	188%

Mean River Flows

Parameter	Background Concentration mg/l (Notionally Clean)	Effluent Standards	Contribution from Primary Discharge (mg/l)	Resultant Concentration (Notionally Clean)	Allowable Concentration Mean mg/l	% of Available WAC
Carbonaceous BOD	0.260	25.00	0.136	0.395	1.500	11%
Ammonia Nitrogen (NH)	0.008	7.30	0.040	0.048	0.065	70%
Ortho Phosphate (OP)	0.005	3.30	0.018	0.023	0.035	60%

Mean River Flows

Parameter	Background Concentration mg/l (Actual)	Effluent Standards	Contribution from Primary Discharge (mg/l)	Resultant Concentration (Actual)	Allowable Concentration Mean mg/l	% of Available WAC
Carbonaceous BOD	0.500	25.00	0.136	0.634	1.500	14%
Ammonia Nitrogen (NH)	0.025	7.30	0.040	0.065	0.065	100%
Ortho Phosphate (OP)	0.017	3.30	0.018	0.035	0.035	100%

T = ((F x C) +(f x c)) / (F + f) mg/l

Where T = Resulting concentration due to the discharge (mg/l)

F = flow in receiving waters at 95%ile (m^3/s) *

C = average background concentration in receiving waters (mg/l)

f = discharge flow (m^3/s)

c = concentration in the discharge (mg/l)

c = T x [(F+f)+(FxC)] / f

Irish Water Report

Appropriate Assessment Screening as part of the Grenagh Waste Water Discharge Licence application.

Contents

Introduction

This report provides an Appropriate Assessment (AA) of the existing Waste Water Treatment Plant (WwTP) at Grenagh, Co Cork, for the purposes of the Waste Water Discharge (Authorisation) Regulations, 2007 (S.I. No. 684 of 2007), as amended. It assesses whether the on-going operation of the plant, alone or in combination with other plans and projects, is likely to have significant effects on a Natura 2000 Site(s) in view of best scientific knowledge and the conservation objectives of the site(s). Natura 2000 Sites are those identified as sites of European Community importance designated as Special Areas of Conservation under the Habitats Directive or as Special Protection Areas under the Birds Directive.

This report follows the guidance for AA published by the Environmental Protection Agency's (EPA) '*Note on Appropriate Assessments for the purposes of the Waste Water Discharge (Authorisation) Regulations, 2007 (S.I. No. 684 of 2007)*' (EPA, 2009); and takes account of the Department of the Environment, Heritage and Local Government's guidelines '*Appropriate Assessment of Plans and Projects in Ireland. Guidance for Planning Authorities*' (DoEHLG, 2009) and Circular L8/08 '*Water Services Investment and Rural Water Programmes – Protection of Natural Heritage and National Monuments*' (DoEHLG, 2008).

Legislative Context

The Council Directive 92/43/EEC on the Conservation of Natural Habitats and of Wild Fauna and Flora, better known as "The Habitats Directive", provides legal protection for habitats and species of European importance. Articles 3 to 9 provide the legislative means to protect habitats and species of Community interest through the establishment and conservation of an EU-wide network of sites known as Natura 2000. These are Special Areas of Conservation (SACs) designated under the Habitats Directive and Special Protection Areas (SPAs) designated under the Conservation of Wild Birds Directive (79/409/ECC) as codified by Directive 2009/147/EC.

Articles 6(3) and 6(4) of the Habitats Directive set out the decision-making tests for plans and projects likely to affect Natura 2000 sites (Annex 1.1). Article 6(3) establishes the requirement for Appropriate Assessment (AA):

> *Any plan or project not directly connected with or necessary to the management of the [Natura 2000] site but likely to have a significant effect thereon, either individually or in combination with other plans or projects, shall be subjected to appropriate assessment of its implications for the site in view of the site's conservation objectives. In light of the conclusions of the assessment of the implications for the site and subject to the provisions of paragraph 4, the competent national authorities shall agree to the plan or project only after having ascertained that it will not adversely affect the integrity of the site concerned and, if appropriate, after having obtained the opinion of the general public.*

Article 6(4) states:

> *If, in spite of a negative assessment of the implications for the [Natura 2000] site and in the absence of alternative solutions, a plan or project must nevertheless be carried out for imperative reasons of overriding public interest, including those of a social or economic nature, Member States shall take all compensatory measures necessary to ensure that the overall coherence of Natura 2000 is protected. It shall inform the Commission of the compensatory measures adopted.*

Methodology

Guidance Followed

Both EU and national guidance exists in relation to Member States fulfilling their requirements under the EU Habitats Directive, with particular reference to Article 6(3) and 6(4) of that Directive. The methodology followed in relation to this AA Screening has had regard to the following guidance:

- Note on Appropriate Assessments for the purposes of the Waste Water Discharge (Authorisation) Regulations, 2007 (S.I. No. 684 of 2007). Environmental Protection Agency, (EPA, 2009).

- Appropriate Assessment of Plans and Projects in Ireland: Guidance for Planning Authorities. Department of Environment, Heritage and Local Government, (DoEHLG, 2010).

- Circular L8/08 – Water Services Investment and Rural Water Programmes – Protection of Natural Heritage and National Monuments. Department of Environment, Heritage and Local Government, (DoEHLG, 2008).

- Communication from the Commission on the Precautionary Principle. Office for Official Publications of the European Communities, Luxembourg, (EC, 2000a).

- Managing Natura 2000 Sites: the provisions of Article 6 of the 'Habitats' Directive 92/43/EEC, Office for Official Publications of the European Communities, Luxembourg, (EC, 2000b).

- Assessment of plans and projects significantly affecting Natura 2000 sites: Methodological guidance on the provisions of Articles 6(3) and (4) of the Habitats Directive 92/43/EEC. Office for Official Publications of the European Communities, Brussels (EC, 2001).

- Guidance document on Article 6(4) of the 'Habitats Directive' 92/43/EEC – Clarification of the concepts of: alternative solutions, imperative reasons of overriding public interest, compensatory measures, overall coherence, opinion of the Commission. Office for Official Publications of the European Communities, Luxembourg, (EC, 2007).

- Nature and biodiversity cases: Ruling of the European Court of Justice. Office for Official Publications of the European Communities, Luxembourg (EC, 2006).

- Marine Natura Impact Statements in Irish Special Areas of Conservation: A working document, National Parks and Wildlife Service, Dublin (NPWS, 2012).

- European Communities (Birds and Natural Habitats) Regulations, 2011 (S.I. No.477 of 2011).

- Interpretation Manual of European Union Habitats. Version EUR 28. European Commission (EC, 2013).

Stages Involved in the Appropriate Assessment Process

Stage 1: Screening / Test of Significance
This process identifies whether the WwTP discharge is directly connected to or necessary for the management of a Natura 2000 Site(s); and identifies whether the discharge is likely to have significant impacts upon a Natura 2000 Site(s) either alone or in combination with other projects or plans.

The output from this stage is a determination for each Natura 2000 Site(s) of not significant, significant, potentially significant, or uncertain effects. The latter three determinations will cause that site to be brought forward to Stage 2.

Stage 2: Appropriate Assessment
This stage considers the impact of the WwTP discharge on the integrity of a Natura 2000 Site(s), either alone or in combination with other projects or plans, with respect to (1) the site's conservation objectives; and (2) the site's structure and function and its overall integrity. Additionally, where there are adverse impacts, an assessment of the potential mitigation of those impacts

The output from this stage is a Natura Impact Statement (NIS). This document must include sufficient information for the EPA to carry out the appropriate assessment. If the assessment is negative, i.e. adverse effects on the integrity of a site cannot be excluded, then the process must consider alternatives (Stage 3) or proceed to Stage 4.

Stage 3: Assessment of Alternatives
This process examines alternative ways of achieving the objectives of the project or plan that avoid adverse impacts on the integrity of the Natura 2000 Site. This assessment may be carried out concurrently with Stage 2 in order to find the most appropriate solution. If no alternatives exist or all alternatives would result in negative impacts to the integrity of the Natura 2000 Sites then the process either moves to Stage 4 or the project is abandoned.

Stage 4: Assessment Where Adverse Impacts Remain
An assessment of compensatory measures where, in the light of an assessment of Imperative Reasons of Overriding Public Interest (IROPI), it is deemed that the project or plan should proceed.

Stage 1: Screening / Test of Significance

In complying with the obligations under Article 6(3) and following the appropriate guidelines, this AA Screening has been structured as a stage by stage approach as follows:

- Description of the project;
- Identification of Natura 2000 sites potentially affected;
- Identification and description of individual and cumulative impacts likely to result;
- Assessment of the significance of the impacts identified above on site integrity;
- Exclusion of sites where it can be objectively concluded that there will be no significant effects; and
- Screening conclusion.

Consultation

The EPA, as the competent authority, will seek NPWS advice as may be required in reaching their decision on a WwTP discharge. The NPWS can only communicate with the applicant (i.e. Irish Water) on request from the competent authority, when the formal application process to the competent authority has already commenced.

Screening

Description of the Project

The Grenagh Wastewater Treatment Plant (WwTP) is located in Grenagh, County Cork, close to the N20 between Cork and Mallow.

Process Description
The treatment plant at Grenagh has gravity flow throughout, the treatment process includes:

- Mechanical Inlet Screening.
- Gravity overflow to underground storm water storage with pumped return.
- A secondary treatment process based on dual streamed activated sludge.
- Fine bubbled diffused aeration system.
- Dual secondary clarifiers complete with rotating half bridge scrapers systems.
- Single sludge storage tank.
- Block built control building.

The primary discharge point is to the Martin River. The Grenagh agglomeration includes one stormwater overflow system which allows discharge to the River Martin from the storm tank during capacity exceedance.

The current population equivalent for the agglomeration is 592p.e. increasing to 615p.e. by 2023. Based on a current loading of 225l/pp/day the dry weather flow for the current discharge is calculated at 0.00154m^3/sec, with the 2023 dry weather flow calculated at 0.001602m^3/sec. The long-term 95-percentile flow for the Martin River, as obtained from the EPA Hydrotool website, is 0.045 m^3/sec.

Effluent data from 2016 is presented in Table 1.0 together with Urban Wastewater Treatment Regulations (UWWT) limit values.

Table 1.0: Grenagh WwTP Effluent Monitoring Data

Date	BOD mg/l O2	COD mg/l O2	SS mg/l
UWWT ELV*	25	125	35
28/1/16	1.5	10.5	1.25

* Limits set for plants >2000p.e. for BOD, COD and SS in Schedule 2, Part 1 of the UWWT Regulations 2001 (S.I. 254 of 2001); Limits set for plants >10,000p.e. for Total Nitrogen and Total Phosphorus in Schedule 2, Part 1 of the UWWT Regulations 2001 (S.I. 254 of 2001) for discharges to sensitive waters listed in Schedule 1 of the UWWT (Amendment) Regulations 2010 (S.I. 48 of 2010) subject to EPA determination following amended regulation 4(3) of S.I. No 254/2001.

The effluent discharge meets the Urban Wastewater Treatment Regulations 2001(S.I. No. 254/2001 as amended) emission limits for BOD, COD and SS. It is noted that as the plant receives a load of <2000 p.e. that these limits will not necessarily apply. The Martin River is not a sensitive water listed on Schedule 1 of the Urban Waste Water Treatment (Amendment) Regulations 2010 (S.I. No. 48/2010/0), though downstream this River eventually enters the Lee Estuary/Lough Mahon sensitive water.

Description of the Receiving Environment and Monitoring Results

Monitoring data from 2012 from locations in the Martin River upstream and downstream of the discharge point can be seen in Table 2.0. The data demonstrates that the water quality in both cases is in compliance with Schedule 5 of the European Communities Environmental Objectives (Surface Water) Regulations 2009 (S.I. No. 272 of 2009).

Table 2.0: Monitoring Data Upstream and Downstream of WwTP Discharge

Parameter	pH	BOD	Ammonia	Orthophosphate
	pH Units	mg/l	mg/l N	mg/l P
SW EQS	4.5-9	≤2.6 (good) ≤2.2 (high)	≤0.14 (good) ≤0.090 (high)	≤0.075 (good) ≤0.045 (high)
Upstream				
17-May-2012	7.7	<1	0.025	0.017
Downstream				
17-May-2012	7.5	1.2	0.036	0.041
5-June-2012	7.4	-	-	-

The EPA monitor the Martin River for biological water quality[1]. The Martin River both upstream and downstream of primary discharge point was assigned Poor WFD status (2010-2015) and is classed as 'at risk of failing to achieve good status'. With respect to water quality, upstream of the WwTP primary discharge point the river was assigned a Q3 rating in 2014 indicating Poor water quality (Br W of Lissavoura RS19M010100). Downstream of the WwTP (ca. 1.3km), the EPA assigned a Q4 rating the Martin River indicating Good water quality (1 km S of Rathduff, SE of Grenagh RS19M010200). Further downstream the river maintains good water quality (RS19M010300) before improving to High water quality just north of Blarney (RS19M010400).

Waste Assimilative Capacity

Table 3.0 summaries the assimilative capacity calculations for BOD which are based on the 2023 estimated loading of 615p.e., 95%ile river flow and water quality standards in the European Communities Environmental Objectives (Surface Water) Regulations, 2009 (S.I. No. 272 of 2009). Assimilative capacity calculations use both actual background concentrations and the 'notionally clean river' approach. Data on effluent Orthophosphate and Ammonia concentrations is not currently available and so the assimilative capacity for these parameters could not be determined.

Table 3.0: Assimilative capacity calculations at estimated 2023 loadings of 615p.e. for actual background concentrations and for a notionally clean river.

Parameter		Background (mg/l)	Predicted downstream quality (mg/l)	EQS* (mg/l)
BOD	Actual Background	1.0	1.017	≤2.6
	Notionally Clean	0.260	0.303	

*European Communities Environmental Objectives (Surface Waters) Regulations 2009, S.I. No. 272 of 2009 (95%ile standards presented).

Using both the actual background concentrations and the notional clean river concentrations demonstrates that the Martin River has available assimilative capacity for BOD.

[1] http://gis.epa.ie/Envision

Brief Description of the Natura 2000 Sites

This section of the screening process describes the Natura 2000 sites within a 15km radius of the WwTP discharge location. A 15km buffer zone has been chosen as a precautionary measure, to ensure that all potentially affected Natura 2000 sites are included in the screening process, which is in line with Appropriate Assessment of Plans and Projects in Ireland – Guidance for Planning Authorities produced by the Department of the Environment, Heritage and Local Government.

Table 4.0 list the SACs that are within 15km of the WwTP discharge location, and Figure 1.0 shows their location in relation to the Grenagh WwTP discharge. The qualifying interests of each of the identified Natura 2000 Sites is also provided. There are no SPA's within 15km of the discharge.

Table 4.0: SACs located within 15km of Grenagh WwTP discharge

Site Code	Site Name	Qualifying Habitats	Qualify Species
002170	Blackwater River (Cork/Waterford) SAC	Estuaries [1130] Mudflats and sandflats not covered by seawater at low tide [1140] Perennial vegetation of stony banks [1220] Salicornia and other annuals colonising mud and sand [1310] Atlantic salt meadows (Glauco-Puccinellietalia maritimae) [1330] Mediterranean salt meadows (Juncetalia maritimi) [1410] Water courses of plain to montane levels with the Ranunculion fluitantis and Callitricho-Batrachion vegetation [3260] Old sessile oak woods with Ilex and *Blechnum* in the British Isles [91A0] Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (Alno-Padion, Alnion incanae, Salicion albae) [91E0] *Trichomanes speciosum* (Killarney Fern) [1421]	*Margaritifera margaritifera* (Freshwater Pearl Mussel) [1029] *Austropotamobius pallipes* (White-clawed Crayfish) [1092] *Petromyzon marinus* (Sea Lamprey) [1095] *Lampetra planeri* (Brook Lamprey) [1096] *Lampetra fluviatilis* (River Lamprey) [1099] *Alosa fallax fallax* (Twaite Shad) [1103] *Salmo salar* (Salmon) [1106] *Lutra lutra* (Otter) [1355]

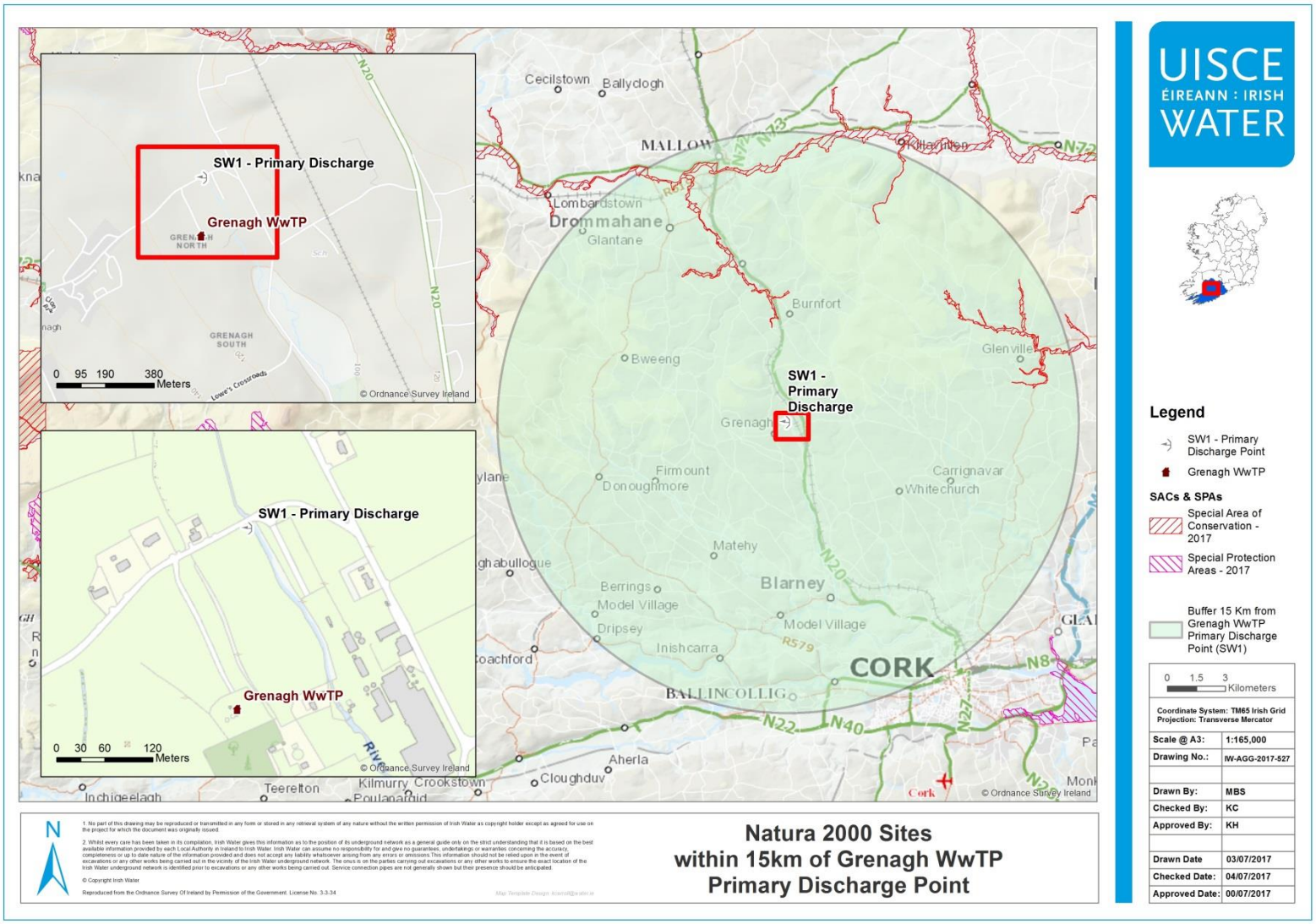


Figure 1.0 Natura 2000 Sites

Possible Effects of the Waste Water Discharge in the Natura 2000 Sites

The purpose of this section of the screening is to examine the possibility that the existing waste water discharge, either individually or in combination with other plans and projects, may result in significant negative effects on the Conservation Objectives and the integrity of the Natura 2000 Sites identified.

The most apparent potential risk to a Natura 2000 Site(s) from a WwTP discharge is to the water quality of the receiving environment, and if the receiving environments water quality has the potential to interact with the qualifying interests of the Natura 2000 Sites identified.

The existing discharge is not directly connected with or necessary to the management of any site for nature conservation.

Direct, Indirect or Secondary Impacts

The WwTP discharges to the Martin River which flows southward joining the Shournagh River and then southeast joining the Lee River entering Cork Harbour.

A single Natura 2000 site, the River Blackwater (Cork/Waterford) SAC lies within 15km of the Grenagh discharge point. This SAC is not hydrologically connected to the Martin River and therefore there is no likelihood of any significant effects arising.

It is noted that Cork Harbour SPA and Great Channel Island SAC are distantly hydrologically connected to the Martin River, though outside of the 15km radius and over 30km via river from the WwTP discharge. While ambient and effluent data is limited, the Martin River downstream of the WwTP meets the Surface Water Regulations standards as indicated by the available monitoring data and supported by the assimilative capacity calculations. Furthermore, as noted earlier, the Martin River improves to High status in the vicinity of Blarney downstream of the WwTP. There is no evidence to suggest that the WwTP discharge is impacting on the Martin River locally, consequently there is no likelihood of any significant effect on water quality in these remotely connected Natura 2000 sites arising from Grenagh WwTP.

In accordance with the Waste Water Discharge (Authorisation) Regulations 2007 (S.I. No. 684 of 2007) the waste water discharged from Grenagh WwTP will not impact on the conservation objectives of Blackwater River (Cork/Waterford) SAC or any remotely connected Natura 2000 site. No significant adverse impacts on the Annex I habitats or Annex II species of any of these Natura 2000 sites are anticipated as a result of the waste water discharge from Grenagh WwTP.

Possible Cumulative Impacts with other Plans and Projects in the Area

As part of Stage 1 Screening, in addition to the existing waste water discharge, other relevant projects and plans in the relevant region must also be considered. This step aims to identify at this early stage any possible significant effects on the Natura 2000 Sites from the waste water discharge in-combination or cumulative with other plans and projects. Existing plans and projects which have been examined include:

- Cork County Development Plan 2014-2020;
- Cork County Biodiversity Action Plan 2009-2014;
- Draft National Biodiversity Action Plan 2017-2021;
- Lower Lee Owenboy Water Management Unit Action Plan 2010

The above plans have been assessed in accordance with Article 6(3) of the Habitats Directive and Part XAB of the Planning and Development Act, 2000, and are not envisaged to result in significant effects on the integrity of the Natura 2000 network.

Cork County Planning Maps were reviewed in order to identify any developments of significance in the area. Applications are all for small scale developments, typically residential and agricultural, which do not have the potential to significantly impact water quality in Martin River in-combination with Grenagh WwTP.

Given Grenagh WwTP is not impacting 'alone' on the Martin River, and given the distance to the nearest connected Natura 2000 sites, there is no potential for the WwTP discharge to contribute to any cumulative impacts on any Natura 2000 site.

Screening Assessment

Table 5.0 provides a summary of the likely significant impact of the current waste water discharge on the conservation objectives of the Natura 2000 sites potentially linked to the Grenagh WwTP as identified in Table 4.0.

Table 5.0: Potential Significant Impacts on Natura 2000 sites from the Grenagh Waste Water Discharge

Site Name	Direct Impacts	Indirect/ Secondary	Resource Requirements (Drinking Water Abstraction Etc.)	Emissions (Disposal to Land, Water or Air)	Excavation Requirements	Transportation Requirements	Duration of Construction, Operation, Decommissioning
Blackwater River (Cork/Waterford) SAC	No impact on qualifying interest	No impact on qualifying interest	No impact on qualifying interest	No impact on qualifying interest	No impact on qualifying interest	No impact on qualifying interest	No impact on qualifying interest

Likely Changes to the Natura 2000 Site(s)

The likely changes that will arise from the Grenagh waste water discharge have been examined in the context of a number of factors that could potentially affect the integrity of the identified Natura 2000 Sites. Overall, it has been found that the current waste water discharge will not affect the integrity of the identified Natura 2000 Sites.

Table 6.0: Likely Affect on Natura 2000 Sites

Site Name	Reduction of Habitat Area	Disturbance to Key Species	Habitat or Species Fragmentation	Reduction in Species Density	Changes in Key Indicators of Conservation Value (Water Quality Etc.)	Climate Change
Blackwater River (Cork/Waterford) SAC	None	None	None	None	None	None

Elements of the Project where the Impacts are Likely to be Significant

No elements of the current waste water discharge are likely to cause significant impacts on NATURA 2000 Sites.

Screening Conclusions and Statement

The likely impacts that will arise from the current waste water discharge have been examined in the context of a number of factors that could potentially affect the integrity of the Natura 2000 network. None of the sites within 15km of the discharge location will be adversely affected. A finding of No Significant Effects Matrix has been completed and is presented in next section of this Screening Statement.

On the basis of the findings of this Screening for Appropriate Assessment of Natura 2000 Sites, it is concluded that the current waste water discharge from the Grenagh WwTP will not have a significant effect on the Natura 2000 network and a Stage 2 Appropriate Assessment is not required.

Finding of No Significant Effects Report Matrix

Name of project or plan	Grenagh Waste Water Discharge License
Name and location of Natura 2000 site	Blackwater River (Cork/Waterford) SAC
Description of the project or plan	The Grenagh Wastewater Treatment Plant (WwTP) is located in Grenagh, County Cork, close to the N20 between Cork and Mallow. The primary discharge point is to the Martin River. The Grenagh agglomeration includes one stormwater overflow system which allows discharge to the River Martin from the storm tank during capacity exceedance.
Is the project or plan directly connected with or necessary to the management of the site?	No.
Are there other projects or plans that together with the project or plan being assessed could affect the site?	No.
The Assessment of Significance of Effects	
Describe how the project or plan (alone or in combination) is likely to affect the European Site(s).	The WwTP discharges to the Martin River which flows southward joining the Shournagh River and then southeast joining the Lee River entering Cork Harbour. A single Natura 2000 site, the River Blackwater (Cork/Waterford) SAC lies within 15km of the Grenagh discharge point. This SAC is not hydrologically connected to the Martin River and therefore there is no likelihood of any significant effects arising. It is noted that Cork Harbour SPA and Great Channel Island SAC are distantly hydrologically connected to the Martin River, though outside of the 15km radius and over 30km via river from the WwTP discharge. While ambient and effluent data is limited, the Martin River downstream of the WwTP meets the Surface Water Regulations standards as indicated by the available monitoring data and supported by the assimilative capacity calculations. Furthermore, as noted earlier, the Martin River improves to High status in the vicinity of Blarney downstream of the WwTP.
Explain why these effects are not considered significant.	There is no evidence to suggest that the WwTP discharge is impacting on the Martin River locally, consequently there is no likelihood of any significant effect on water quality in these remotely connected Natura 2000 sites arising from Grenagh WwTP.

	In accordance with the Waste Water Discharge (Authorisation) Regulations 2007 (S.I. No. 684 of 2007) the waste water discharged from Grenagh WwTP will not impact on the conservation objectives of Blackwater River (Cork/Waterford) SAC or any remotely connected Natura 2000 site. No significant adverse impacts on the Annex I habitats or Annex II species of any of these Natura 2000 sites are anticipated as a result of the waste water discharge from Grenagh WwTP.
List of agencies consulted: provide contact name and telephone or e-mail address.	N/A
Response to consultation.	N/A
Data Collected to Carry Out the Assessment	
Who carried out the assessment?	Qualified Ecologist, Irish Water
Sources of data	NPWS database; EPA database; WFD Ireland database; and Information from Irish Water.
Level of assessment completed	Desktop survey
Where can the full results of the assessment be accessed and viewed?	EPA
Overall Conclusion	Stage 1 Screening indicates that the Glenagh WwTP discharge will not have a significant negative impact on the Natura 2000 network. Therefore, a Stage 2 'Appropriate Assessment' under Article 6(3) of the Habitats Directive 92/43/EEC is not required.

F.1(i)(a) **Upstream Ambient Monitoring Data – Regular Emissions**

Parameter	Results(mg/l)	Sampling Method	Limit of Quantitation	Analysis Method/Technique
	17/05/2012			
pH	7.7	Grab	2	Electrochemical
Temperature	NT	Grab	0.5	Electrochemical
Electrical Conductivity (@25oC)	181	Grab	0.5	Electrochemical
Suspended Solids	<2.5	Grab	0.5	Gravimetric
Ammonia (as N)	0.025	Grab	0.02	Colorimetric
Biochemical Oxygen Demand	<1	Grab	0.06	Electrochemical
Chemical Oxygen Demand	NT	Grab	8	Digestion & Colorimetric
Dissolved Oxygen	NT	Grab	0.2	ISE
Hardness (as CaCo3)	NT	Grab	1	Titrimetric
Total Nitrogen (as N)	4.83	Grab	0.5	Digestion & Colorimetric
Nitrite (as N)	0.006	Grab	0.1	Colorimetric
Nitrate (as N)	3.314	Grab	0.5	Colorimetric
Total Phosphorus (as P)	<0.05	Grab	0.2	Digestion & Colorimetric
Orthophosphate (as P) - unfiltered	0.017	Grab	0.02	Colorimetric
Sulphate (SO4)	<30	Grab	30	Turbidimetric
Phenols (sum) Note : (ug/l)	NT	Grab	0.01	GC-MS2

F.1(i)(b) **Downstream Ambient Monitoring Data – Regular Emissions**

Parameter	Results(mg/l)		Sampling Method	Limit of Quantitation	Analysis Method/Technique
	17/05/2012	05/06/2012			
pH	7.7	7.5	Grab	2	Electrochemical
Temperature	NT	NT	Grab	0.5	Electrochemical
Electrical Conductivity (@25oC)	182	183	Grab	0.5	Electrochemical
Suspended Solids	<2.5	NT	Grab	0.5	Gravimetric
Ammonia (as N)	0.036	NT	Grab	0.02	Colorimetric
Biochemical Oxygen Demand	1.2	NT	Grab	0.06	Electrochemical
Chemical Oxygen Demand	NT	NT	Grab	8	Digestion & Colorimetric
Dissolved Oxygen	NT	NT	Grab	0.2	ISE
Hardness (as CaCo3)	NT	72	Grab	1	Titrimetric
Total Nitrogen (as N)	4.59	NT	Grab	0.5	Digestion & Colorimetric
Nitrite (as N)	0.008	NT	Grab	0.1	Colorimetric
Nitrate (as N)	5.114	NT	Grab	0.5	Colorimetric
Total Phosphorus (as P)	<0.05	NT	Grab	0.2	Digestion & Colorimetric
Orthophosphate (as P) - unfiltered	0.041	NT	Grab	0.02	Colorimetric
Sulphate (SO4)	<30	NT	Grab	30	Turbidimetric
Phenols (sum) Note : (ug/l)	NT	<0.1	Grab	0.01	GC-MS2

F.1(ii)(A) Downstream Ambient Monitoring Data – Dangerous Substances

Parameter	Results(µg/l)	Sampling Method	Limit of Quantitation	Analysis Method/Technique
	05/06/2012			
Atrazine	<0.01	Grab	0.96	HPLC
Dichloromethane	<5	Grab	1	GC MS1
Simazine	<0.01	Grab	0.01	HPLC
Toluene	<0.53	Grab	0.02	GC MS1
Tributyltin	NT	Grab	0.02	GC MS1
Xylenes	<0.73	Grab	1	GC MS1
Arsenic	0.173	Grab	0.96	ICP-MS
Chromium	0.811	Grab	1	ICP-MS
Copper	12.66	Grab	1	ICP-MS
Cyanide	<5	Grab	5	Colorimetric
Fluoride	60	Grab	100	ISE
Lead	3.172	Grab	1	ICP-MS
Nickel	1.374	Grab	1	ICP-MS
Zinc	11.96	Grab	1	ICP-MS
Boron	108.2	Grab	1	ICP-MS
Cadmium	0.03	Grab	1	ICP-MS
Mercury	<0.03	Grab	0.2	ICP-MS
Selenium	<0.54	Grab	0.74	ICP-MS
Barium	14.74	Grab	1	ICP-MS

Note: No sampling data from receiving waters upstream of WWTP for substances listed in Water Quality (Dangerous Substances) Regulations, 2001 (S.I. 12 of 2001) was made available. The sampling data for dangerous susbtances from samples taken downstream of the WWTP indicate the concentrations below the standards set in the Water Quality (Dangerous Substances) Regulations, 2001 (S.I. 12 of 2001).

SECTION F – EXISTING ENVIRONMENT & IMAPCT OF THE DISCHARGE(S)

Attachment F2: Cryptosporidium Risk Assessment

Cryptosporidium Risk Assessment

At

Lee Road Waterworks

Revision Control Table

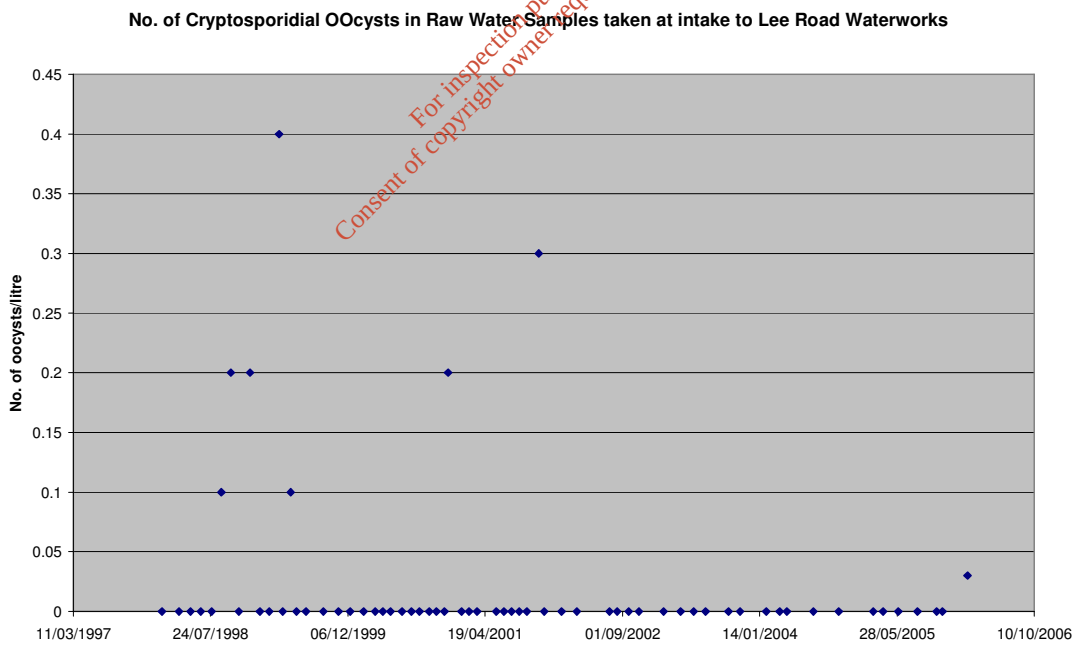
Revision No.	Description of changes	Prepared by	Date
4	Revised score to source type – 8 instead of 4	BG	31/3/2006
3	Scottish model 2003 Directions. Entire document reviewed.	BG	11/10/2005
2	Once monthly continuous monitoring introduced	BG	19/08/2005
1	Blarney sewage treatment plant included in assessment risk.	BG	24/02/2004
0	Final draft – 1st issue	BG/KOD	14/11/2002

Background

This document is based on the Scottish Model – *The Cryptosporidium (Scottish Water) Directions 2003* as recommended by the EPA. This methodology with some modifications to the text is outlined in Appendix 6 of the document *European Communities (Drinking Water) Regulations, 2000 (S.I. 439 of 2000) A Handbook on Implementation for Sanitary Authorities* published by the EPA. The text of this document is reproduced in Appendix 1 of this document. Use has also been made of a template spreadsheet for risk assessment developed by Michael Lavelle of Cork County Council.

Cryptosporidium Monitoring at the Lee Road Waterworks

Sampling of both the raw water and treated water at the Lee Road has been ongoing since 1998. One grab sample is taken each month from the intake and treated water leaving the plant and sent to Dublin for analysis. Since March 2005 a Filta Max filter system has been in place for monitoring the final water outflow of the plant and a similar system has now been setup for the Raw Water since February 2006. Todate, no cryptosporidum has been detected in the treated water. However, it has been found in the raw water as follows:



As can be seen, there are some shows though most results show zero concentrations. It should be noted that most of these individual samples represent a snapshot in time and place and are unrepresentative. Nothing had been found for a number of years since 31/10/2001 but the first run of the Filta Max in February 2006 found 3 oocysts in 100 litres.

Risk Assessment Scoring:

Supply Classification	Risk Assessment Score	Action to be taken by water authorities on completion of a risk assessment
Very High Risk	>100	Improve treatment process to reduce the risk to lower risk category. Implement continuous monitoring of treated water for Cryptosporidium.
High Risk	76-100	Improve treatment process to reduce the risk to lower risk category. Implement continuous monitoring of treated water for Cryptosporidium.
Moderate Risk	50-75	Improve treatment process to reduce the risk to lower risk category. Implement continuous monitoring of treated water for Cryptosporidium.
Low Risk	<50	No need to monitor supplies unless there is an outbreak of cryptosporidiosis occurs within the supply area.

Assessment

Scheme **Lee Road Waterworks**

Enter the Scheme name in the box above and on the Tab and enter the name of the source in the box below.

Source **River Lee**

Enter the assessed score in the shaded boxes on the right of the table. The excel sheet will do all of the calculations.

SURFACE WATER RISK ASSESSMENT (CATCHMENT RISK SCORE)

Animals within the Catchment

Item No.	Risk Factor	Item Scores	Score
1.1	Cattle/calves at less than or equal to one animal per hectare of forage area. If density not known assume more than one animal per hectare of forage area.	6	**12**
1.2	Cattle/calves at more than one animal per hectare of forage area. If density not known assume more than one animal per hectare of forage area.	12	
1.3	Sheep/lambs at less than or equal to one animal per hectare of forage area.If density not known assume more than one animal per hectare of forage area.	6	**6**
1.4	Sheep/lambs at more than one animal per hectare of forage area.If density not known assume more than one animal per hectare of forage area.	12	
1.5	Wild or farmed deer	2	**0**
1.6	Pig farms	2	**2**
1.7	Animals have direct access to water sources including feeder streams	4	**4**
1.8	Fencing prevents access to water sources including feeder streams	-1	
1.9	High numbers of birds	2	**0**
1,10	Any other farmed animal or bird	1	**0**
	SCORE FOR SECTION 1;		**24**

Agricultural Practices within the Catchment

2.1	Slurry spraying	6	**6**
2.2	Dung spreading	3	**3**
2.3	Slurry or dung stores	3	**3**
2.4	Sheep pens or cattle byres	6	**6**
2.5	Lambing or calving on the catchment	8	**8**
	SCORE FOR SECTION 2;		**26**

Discharges to the Catchment / Water Source

3.1	Population served by all septic tanks = 100	4	**6**
3.2	Population served by all septic tanks > 100	6	
3.3	Population equivalent served by all sewage works <100	4	**7**
3.4	Population equivalent served by all sewage works 500 to 5,000	5	
3.5	Population equivalent served by all sewage works 5,001 to 20,000	6	
3.6	Population equivalent served by all sewage works 20,001 to 50,000	7	
3.7	Population equivalent served by all sewage works > 50,000	8	
3.8	Storm sewage overflows (Regardless of number)	2	**2**
3.9	Abattoirs/livestock markets (Regardless of number)	2	**2**
	SCORE FOR SECTION 3;		**17**

Water Source Type

4.1	Secure natural springs – vulnerable soil/hydrogeology	4	**8**

4.2	Secure natural springs – non-vulnerable soil/hydrogeology	1	
4.3	Other shallow underground sources - vulnerable soil/hydrogeology	4	
4.4	Other shallow underground sources – non-vulnerable soil/hydrogeology	2	
4.5	Upland reservoir	2	
4.6	Lowland long term storage reservoir	4	
4.7	Upland river or stream – direct abstraction	6	
4.8	Lowland river or stream – direct abstraction or bankside storage	8	
	SCORE FOR SECTION 4;		**8**

Raw Water Aquaducts

5.1	Raw water aqueduct known or suspected to be vulnerable to contamination from farmland	8	**0**
5.2	Raw water aqueduct proven to be secure contamination from farmland within past five years	0	
5.3	No Aquaduct bringing water from source to treatment plant	0	
	SCORE FOR SECTION 5;		**0**

Catchment Inspections

6.1	Catchment inspections carried out at least monthly	-3	**-3**
6.2	Catchment inspections carried out less frequently	6	
6.3	Procedures in place to deal with irregularities on the catchment	-3	**-3**
6.4	No procedures in place to deal with irregularities on the catchment	0	
	SCORE FOR SECTION 6;		**-6**

Raw Water Intake Management for Direct Abstraction

7.1	No turbidity monitor on intake	3	**-2**
7.2	Turbidity monitor on intake that is alarmed and connected to telemetry	-2	
7.3	Automatic intake shut down when poor water quality	-4	**-1**
7.4	Manual intake shut down when poor water quality	-1	
7.5	No intake shut down when poor water quality	3	
	SCORE FOR SECTION 7;		**-3**

Surface Water Catchment Risk Score (Sections 1 to 7) 66

WATER TREATMENT PROCESSES

8.1	Disinfection only	10	**-10**
8.2	Microstraining	10	
8.3	Simple sand filtration (not slow sand filtration)	8	
8.4	Coagulation followed by DAF/sedimentation and filtration	-10	
8.5	Coagulation followed by rapid gravity or pressure filtration (no flotation or sedimentation)	-7	
8.6	Slow sand filtration	-9	
8.7	Membrane filtration (on Scottish Executive or DWI list)	-16	
8.8	Membrane filtration (not on Scottish Executive or DWI list	-2	
8.9	Cartridge/Kalsep filtration	-2	
8,10	Filtamat or similar filtration system	-2	
	SCORE FOR SECTION 8;		**-10**

For section 9 below complete only the relevant section. Ignore the other 2.

Treatment Works Monitoring of Coagulation and Filtration

Rapid gravity and pressure filters

9.1	Turbidity meter on each filter with alarm on telemetry	-5	**2**
9.2	Turbidity meter on each filter but no alarm on telemetry	0	
9.3	One turbidity meter shared by more than one filter with alarm on telemetry	-2	

9.4	One turbidity meter shared by more than one filter but no alarm on telemetry	2	
9.5	No turbidity meters monitoring filter performance	10	
9.6	Final water turbidity meter with alarm on telemetry	-2	**2**
9.7	Final water turbidity meter but no alarm on telemetry	2	
9.8	No final water turbidity meter	5	
9.9	Particle counter used continuously to monitor filter performance	-5	**0**
9,10	Continuous residual coagulant monitor on combined filtrate or works outlet with alarm	-5	**5**
9.11	Continuous residual coagulant monitor on combined filtrate or works outlet but no alarm	-1	
9.12	No continuous residual coagulant monitor on combined filtrate or works outlet	5	
9.13	Routine discrete monitoring of treated water for turbidity/residual coagulant	-2	**-2**
9.14	No routine discrete monitoring of treated water for turbidity/residual coagulant	2	
9.15	Turbidity of backwash supernatant monitored when recycled	-2	**0**
9.16	Turbidity of backwash supernatant not monitored when recycled	2	
	9.1 to 9.16		**7**

Slow sand filters

9.17	Turbidity meter on each filter with alarm on telemetry	-5	**0**
9.18	Turbidity meter on each filter but no alarm on telemetry	0	
9.19	One turbidity meter shared by more than one filter with alarm on telemetry	-2	
9,20	One turbidity meter shared by more than one filter but no alarm on telemetry	2	
9.21	No turbidity meters monitoring filter performance	10	
9.22	Final water turbidity meter with alarm on telemetry	-2	**0**
9.23	Final water turbidity meter but no alarm on telemetry	2	
9.24	No final water turbidity meter		
9.25	Particle counter used continuously to monitor filter performance	-5	**0**
9.26	Filters matured and filtrate analysed for turbidity, coliforms and Cryptosporidium during maturation	-4	**0**
9.27	Filters matured but no analysis carried out on filtrate	5	
9.28	Filters not matured	15	
	9.17 to 9.28		**0**

Membrane filters

9.29	Plant monitored and alarmed for integrity	-3	**0**
9,30	Plant monitored for integrity but not alarmed	0	
9.31	Plant not monitored for integrity	10	
9.32	Particle counter used continuously to monitor filter performance	-5	**0**
	9.29 to 9.32		**0**
	SCORE FOR SECTION 9 [9.1 to 9.16] or [9.17 to 9.28] or [9.29 to 9.32];		**7**

Rapid Gravity and Pressure Filter Works Performance

10.1	Final water turbidity increases by more than 50%, excluding normal backwash period	4	**0**
10.2	Treated water turbidity increases by less than 50%, excluding normal backwash period	0	
10.3	Media loss from any filter has brought media depth below design level	6	**0**

10.4	Media depth above minimum design level with audit trail maintained	-2	
10.5	Signs of media cracking on any filter	4	4
10.6	All filters have been drained, inspected and any necessary remedial action taken within last year	-2	0
10.7	Air scour and backwash maintained and operating efficiently as per maintenance manual	-2	-2
	SCORE FOR SECTION 10;		**2**

Treatment works Operation

11.1	Process control manuals specific to works available	-1	-1
11.2	Process control manuals specific to works not available	1	
11.3	Auditable action plans available for dealing with deviations in quality	-1	1
11.4	Auditable action plans not available for dealing with deviations in quality	1	
11.5	Slow start facility on filters operational	-4	-4
11.6	No slow start facility on filters, or slow start facility not operational	4	
11.7	Filters run to waste for appropriate period after backwash	-6	4
11.8	Filters run to head of works for a period following backwash	-4	
11.9	Filters not run to waste or head of works for a period following backwash	4	
11,10	Backwash water and/or sludge supernatant has to be recycled	2	-2
11.11	Other disposal route available for backwash water and sludge supernatant	-2	
11.12	Water flow through works when operating has not varied by >10% in <30 minutes in last 12 months	-2	2
11.13	Water flow through works when operating has varied by >10% in <30 minutes in last 12 months	2	
11.14	Flow through works above design flow for >10% of time in last 12 months	4	4
11.15	Flow through works above design flow for =10% of time in last 12 months	0	
	SCORE FOR SECTION 11;		**4**

Surface Water Treatment and Supply Risk Score (Sections 8, 9, 10 and 11) 3

Final Weighted Surface Water Risk Assessment Score (Sections 1 to 11) 69

Population Criterion

The population weighting factor is 0.4 x log10 (population served by the supply). The final weighted surface water risk assessment score is the final surface water risk assessment score x the population weighting factor.		
Insert the population at risk in the shaded box on the next line		
Population Served	**90,000**	
Log to the base 10 of the population served	4.95	
0.4 (Log to the base 10 of pop served)	**1.98**	
Cryptosporidium Risk Score	**137**	

Comments / notes concerning peculiarities of this scheme or this evaluation

Insert Name of Assessor and Date of the Assessment (Date Month and Year e.g.13/04/2005)) in the blue boxes below

Assessment undertaken by

Brendan Goggin, Cork City Council

Date 31/03/2006

Improvements in the existing plant to reduce the risk.

Items 1 – 5	Reduce Score by:
It is not possible to change the first 4 categories – thus the score for these will remain the same. (These are the Animals on the Catchment, Agricultural Practices on the Catchment, Discharges into the Catchment/ Water Source, Water Source Type and Raw Water Aqueducts.	0
Item 6: Catchment Inspections	
Already have the maximum score possible here.	0
Item 7: Raw Water Intake Management for Direct Abstractions	
Automatic shutdown would be expensive and may not even be desirable. No change.	0
Item 8: Water Treatment Processes	0
Already have maximum score here.	
Item 9: Treatment Works Monitoring of Coagulation and Filtration.	
Putting a turbidity meter on each filter, at a cost of €36,000, would reduce the score by 3. Alarm on final water turbidity would reduce score by 4. This is almost complete – already is on telemetry. This should be in place by next year. Reasonable expectation – reduce score by 4.	4
Item 10: Rapid Gravity and Pressure Filter Works Performance	
There is severe cracking on all filters. Probably all require a filter media replacement at this stage. This would be very costly and in view of the proposed upgrade probably wasteful. The filters are also overloaded.	0
Item 11: Treatment works operation	
Filters could be left run to waste for a while after backwash. This is not easily done at this stage as the wash sequence was programmed into a PLC over 20 years ago and the entire system is delicate to say the least. This system may have to be looked at if the improvement project does not go ahead in the short term. This could reduce the score by 10. If the winter peak was eliminated, the variation in flow through the plant could be kept within 10%. This would reduce the score by 4. This not desirable Reasonable expectation (optimistic) – reduce score by 10	10
Total:	**14**

Conclusions and Recommendations

Based on the recommended risk assessment procedure, i.e. The Scottish Model, the waterworks plant at Lee Road is at ***Very High Risk*** of allowing Cryptosporidium into the water distribution network. Even if moderate improvements were made to the existing plant, the Plant would remain in the ***Very High Risk Category (137-14=123)***. The recommended procedure is to either put in place measures which will bring the risk down to the ***Low Risk*** category and in the meantime to put in place continuous monitoring. In view of the imminent plant upgrade, it would not be economically viable to put these measures in place and thus the latter solution of implementing continuous monitoring has been partly put in place.

Appendix 1

EPA Guidance Document to Drinking Water Regulations RISK ASSESSMENT FOR CRYPTOSPORIDIUM

INTRODUCTION

A specific risk assessment methodology for *Cryptosporidium* is given below as an example of the application of the above general principles set out in Section 9.

One of the most significant drinking water and public health issues in recent years in the United Kingdom and elsewhere has been outbreaks of cryptosporidiosis related to drinking water supplies. A UK Group of Experts on *Cryptosporidium* in water supplies has published three reports giving comprehensive advice to water suppliers and other organisations. One of the recommendations of the Group of Experts is that water suppliers should carry out risk assessments for each of their water supplies, although the methodology to be used is not specified in any detail.

The Drinking Water Inspectorate has published a methodology for water suppliers in England and Wales to use to meet the requirement in Regulations to carry out risk assessments for *Cryptosporidium.* This methodology sets out the factors that water suppliers are required to take into account. Where the water supplier has found a significant risk the Regulations require it to install treatment to meet the treatment standard of an average of less than one oocyst per 10 litres and to monitor the treated water continuously to establish whether the treatment standard is met. The water supplier uses the professional judgement of its scientists to decide when there is a significant risk. The methodology does not include any quantification of the risks such as a scoring system.

The Scottish Executive has published a similar methodology for Scottish Water to use to meet the requirement in the Directions to carry out risk assessments for *Cryptosporidium.* The original Directions were made in 2000. The Scottish Executive has reviewed these Directions in the light of experience of their use and has proposed new Directions. The new Directions are “The *Cryptosporidium* (Scottish Water) Directions 2003”. This methodology, in addition to setting out the factors that Scottish Water is required to take into account, sets out a quantitative scoring system for each factor to enable Scottish Water to determine whether each supply is high, medium or low risk. The new 2003 Directions specify the frequency of sampling of both raw water and treated water at each treatment works. The frequency for raw water depends on the catchment risk score and the maximum design flow of the works and ranges between no samples per year for small works and low risk catchments to 52 samples per year for large works and high risk catchments. The frequency for treated waters depends on the catchment plus treatment risk score and the maximum design flow of the works and ranges from 12 samples per year for small, low risk works to 365samples per year for large, high risk works. Each sample must be taken continuously and for frequencies of less than 365 samples per year the period over which each sample is taken must be a minimum of 24 hours and a maximum of 36 hours. The National Disease Surveillance Centre in its draft report on a waterborne outbreak of cryptosporidiosis

prepared by a sub-committee of its Scientific Advisory Committee has included the *Cryptosporidium* risk assessment methodology published by the Scottish Executive in the original 2000 Directions.

An assessment has been made of these two risk assessment methodologies to decide which one would be most appropriate for sanitary authorities and private water suppliers in Ireland. It is considered that a methodology relying on a quantitative scoring system rather than professional judgement is more appropriate for the sanitary authorities and private water suppliers. Therefore it is recommended that sanitary authorities and private water suppliers use the Scottish methodology in the new 2003 Directions involving a relatively simple quantitative scoring system that assesses the risk by identifying the factors for the potential for *Cryptosporidium* being present in water supplies. The higher the score, the greater the potential risk. The methodology involves assessing surface water supplies separately from groundwater supplies. For both types of supply a catchment risk score and a treatment/supply risk score is calculated separately and then the two scores for each type are added and population weighted to give a final risk score. This methodology, with some modifications to the text, is given in the paragraphs below.

SURFACE WATER RISK ASSESSMENT (CATCHMENT RISK SCORE)

Surface water is defined as water that is open to the atmosphere and subject to surface run off. It includes rivers, streams, lakes, loughs, reservoirs (impounding and pumped long term and bankside storage), springs and shallow underground sources (such as river gravels). Where there is more than one source supplying a treatment works, each source should be assessed individually and the highest score used to calculate the combined catchment and treatment and supply score, and the final, population weighted score.

Animals within the Catchment

Sheep and cattle, particularly when lambing or calving, are significant sources of *Cryptosporidium.* The higher the density of animals in the forage area the higher the potential risk. Forage areas are defined as grass, open woodland, rape for stock feed, rough grazing, turnips/swedes for stock feed and other crops for stock feed. Deer (also when high numbers in the wild) and pigs, particularly if farmed close to water sources, can also be a source of *Cryptosporidium*. The risk is higher when animals have direct access to water. High numbers of birds, particularly when roosting on or near water sources, can also be a source of *Cryptosporidium*. The total score for item 1 is the sum of the scores from items 1.1 **or** 1.2, 1.3 **or** 1.4, 1.5, 1.6, 1.7 **or** 1.8, 1.9 and 1.10.

Item No.	Risk Factor	Score
1.1	Cattle/calves at less than or equal to one animal per hectare of forage area. If density not known assume more than one animal per hectare of forage area.	6
1.2	Cattle/calves at more than one animal per hectare of forage area. If density not known assume more than one animal per hectare of forage area.	12

1.3	Sheep/lambs at less than or equal to one animal per hectare of forage area. If density not known assume more than one animal per hectare of forage area.	6
1.4	Sheep/lambs at more than one animal per hectare of forage area. If density not known assume more than one animal per hectare of forage area.	12
1.5	Wild or farmed deer	2
1.6	Pig farms	2
1.7	Animals have direct access to water sources including feeder streams	4
1.8	Fencing prevents access to water sources including feeder streams	-1
1.9	High numbers of birds	2
1,10	Any other farmed animal or bird	1

Agricultural Practices within the Catchment

Slurry spraying and dung spreading, particularly the former, pose a high risk of *Cryptosporidium* contamination of water sources. Although well kept and managed slurry stores can kill oocysts, there is no way of knowing how effectively they are being operated and therefore a risk should be assumed. Sheep pens and cattle byres and lambing or calving on the catchment present a potential risk. The total score for Item 2 is the sum of the scores for each of the risk factors in the table below that is taking place on the catchment.

Item No.	Risk Factor	Score
2.1	Slurry spraying	6
2.2	Dung spreading	3
2.3	Slurry or dung stores	3
2.4	Sheep pens or cattle byres	6
2.5	Lambing or calving on the catchment	8

Discharges to the Catchment / Water Source

Sewage works and septic tanks may not remove oocysts if there is cryptosporidiosis in the community, so there could be oocysts in the sewage works or septic tank effluent and that effluent could enter a raw water source. The impact of septic tanks and sewage works is scored separately on the basis of the total population served by **all** tanks or works in the catchment. Storm sewage overflows (outlets) and abattoirs/livestock markets are also a potential source of *Cryptosporidium* and each should be scored only once even when there is more than one of each discharging into the catchment. The total score for item 3 is the sum of the scores from items 3.1 **or** 3.2, 3.3 **or** 3.4 **or** 3.5 **or** 3.6 **or** 3.7, 3.8 and 3.9.

Item No.	Risk Factor	Score
3.1	Population served by all septic tanks ≤ 100	4
3.2	Population served by all septic tanks > 100	6
3.3	Population equivalent served by all sewage works <100	4

3.4	Population equivalent served by all sewage works 500 to 5,000	5
3.5	Population equivalent served by all sewage works 5,001 to 20,000	6
3.6	Population equivalent served by all sewage works 20,001 to 50,000	7
3.7	Population equivalent served by all sewage works > 50,000	8
3.8	Storm sewage overflows (Regardless of number)	2
3.9	Abattoirs/livestock markets (Regardless of number)	2

Water Source Type

Surface water sources present the highest risk from *Cryptosporidium,* particularly when there is direct abstraction from a river or stream. Lowland rivers present a greater risk than upland reservoirs. The risk from springs and shallow underground sources depends on hydrogeological factors, particularly their vulnerability to contamination from activities on the surface. The total score for item 4 consists of one score from the list of sources in the table below (no adding of scores).

Item No.	Risk Factor	Score
4.1	Secure natural springs – vulnerable soil/hydrogeology	4
4.2	Secure natural springs – non-vulnerable soil/hydrogeology	1
4.3	Other shallow underground sources - vulnerable soil/hydrogeology	4
4.4	Other shallow underground sources - non-vulnerable soil/hydrogeology	2
4.5	Upland reservoir	2
4.6	Lowland long term storage reservoir	4
4.7	Upland river or stream – direct abstraction	6
4.8	Lowland river or stream – direct abstraction or bankside storage	8

Raw Water Aquaducts

If the raw water is transferred to the treatment works in an aqueduct, this item should be scored. The total score for item 5 is the score from items 5.1 **or** 5.2.

Item No.	Risk Factor	Score
5.1	Raw water aqueduct known or suspected to be vulnerable to contamination from farmland	8
5.2	Raw water aqueduct proven to be secure contamination from farmland within past five years	0

Catchment Inspections

Regular catchment inspections and procedures to deal with any identified irregularities reduce the risk from *Cryptosporidium*. The total score for item 6 is the sum of the scores

Item No.	Risk Factor	Score

6.1	Catchment inspections carried out at least monthly	-3
6.2	Catchment inspections carried out less frequently	6
6.3	Procedures in place to deal with irregularities on the catchment	3

Raw Water Intake Management for Direct Abstraction
This item should only be scored if the raw water is abstracted directly from a river or stream and for lowland rivers with direct abstraction into a short-term bankside storage reservoir. Risk is reduced when turbidity monitors are installed at the intake and further reduced when the monitors are alarmed and the intake shut when poor water quality conditions are detected. The total score for item 7 is the sum of the scores from items 7.1 **or** 7.2 and 7.3 **or** 7.4 **or** 7.5.

Item No.	Risk Factor	Score
7.1	No turbidity monitor on intake	3
7.2	Turbidity monitor on intake that is alarmed and connected to telemetry	-2
7.3	Automatic intake shut down when poor water quality	-4
7.4	Manual intake shut down when poor water quality	-1
7.5	No intake shut down when poor water quality	3

Surface Water Catchment Risk Score
Calculate the surface water catchment risk score by adding the scores from items 1, 2, 3, 4, 5, 6 (if applicable) and 7 (if applicable).

Surface Water Risk Assessment (Treatment and Supply Risk Score)
If there is more than one treatment process stream at the water treatment works, each treatment process stream should be scored separately and the highest scoring treatment process stream should be used to calculate the treatment and supply risk score and the combined catchment and treatment and supply risk score and the final population weighted score.

Water Treatment Processes
It is well established that some treatment processes are much more effective in removing *Cryptosporidium,* and therefore reducing the risk, than others. The most effective processes are those that use membrane filtration or coagulation followed by sedimentation or dissolved air flotation and filtration. Membrane filtration is particularly effective when the membrane is capable of removing or retaining particles greater that one micron diameter – the Scottish Executive and the Drinking Water Inspectorate publish lists of membrane products that achieve this performance. Simple disinfection and microstraining do not reduce the risk from *Cryptosporidium.* The total score for item 8 is one of the scores from the risk factors in the table below based on the principal treatment at the works.

Item No.	Risk Factor	Score
8.1	Disinfection only	10

8.2	Microstraining	10
8.3	Simple sand filtration (not slow sand filtration)	8
8.4	Coagulation followed by DAF/sedimentation and filtration	-10
8.5	Coagulation followed by rapid gravity or pressure filtration (no flotation or sedimentation)	-7
8.6	Slow sand filtration	-9
8.7	Membrane filtration (on Scottish Executive or DWI list)	-16
8.8	Membrane filtration (not on Scottish Executive or DWI list	-2
8.9	Cartridge/Kalsep filtration	-2
8,10	Filtamat or similar filtration system	-2

Treatment Works Monitoring of Coagulation and Filtration

This section only applies when coagulation and filtration or filtration only is part of the water treatment process. Turbidity meters provide a good indication of filtration efficiency. Where turbidity meters are fitted and are alarmed so action can be taken, the risk from *Cryptosporidium* is reduced. Similarly a residual coagulant monitor on the outlet of the works, particularly when alarmed, provides an indication of the efficiency of the coagulation and filtration process. When membrane filters have an alarm to monitor the integrity of the membrane or have particle counters to monitor performance, the risk from *Cryptosporidium* is reduced. Routine discrete monitoring of treated water quality is also important. For **rapid gravity or pressure filters** the total score for item 9 is the sum of the scores for items 9.1 **or** 9.2 **or** 9.3 **or** 9.4 **or** 9.5, 9.6 **or** 9.7 **or** 9.8, 9.9, 9.10 **or** 9.11 **or** 9.12, 9.13 **or** 9.14, and 9.15 **or** 9.16. For **slow sand filters** the total score for item 9 is the sum of the scores for items 9.17 **or** 9.18 **or** 9.19 **or** 9.20 **or** 9.21, 9.22 **or** 9.23 **or** 9.24, 9.25, and 9.26 **or** 9.27 **or** 9.28. For **membrane filters** the total score for item 9 is the sum of the scores for items 9.29 **or** 9.30 **or** 9.31, and 9.32.

Rapid gravity and pressure filters

Item No.	Risk Factor	Score
9.1	Turbidity meter on each filter with alarm on telemetry	-5
9.2	Turbidity meter on each filter but no alarm on telemetry	0
9.3	One turbidity meter shared by more than one filter with alarm on telemetry	-2
9.4	One turbidity meter shared by more than one filter but no alarm on telemetry	2
9.5	No turbidity meters monitoring filter performance	10
9.6	Final water turbidity meter with alarm on telemetry	-2
9.7	Final water turbidity meter but no alarm on telemetry	2
9.8	No final water turbidity meter	5
9.9	Particle counter used continuously to monitor filter performance	-5
9,10	Continuous residual coagulant monitor on combined filtrate or works outlet with alarm	-5
9.11	Continuous residual coagulant monitor on combined filtrate or works outlet but no alarm	-1
9.12	No continuous residual coagulant monitor on combined filtrate or works outlet	5

9.13	Routine discrete monitoring of treated water for turbidity/residual coagulant	-2
9.14	No routine discrete monitoring of treated water for turbidity/residual coagulant	2
9.15	Turbidity of backwash supernatant monitored when	-2
9.16	Turbidity of backwash supernatant not monitored when recycled	2

Slow sand filters

9.17	Turbidity meter on each filter with alarm on telemetry	-5
9.18	Turbidity meter on each filter but no alarm on telemetry	0
9.19	One turbidity meter shared by more than one filter with alarm on telemetry	-2
9,20	One turbidity meter shared by more than one filter but no alarm on telemetry	2
9.21	No turbidity meters monitoring filter performance	10
9.22	Final water turbidity meter with alarm on telemetry	-2
9.23	Final water turbidity meter but no alarm on telemetry	2
9.24	No final water turbidity meter	5
9.25	Particle counter used continuously to monitor filter performance	-5
9.26	Filters matured and filtrate analysed for turbidity, coliforms and Cryptosporidium during maturation	-4
9.27	Filters matured but no analysis carried out on filtrate	5
9.28	Filters not matured	15

Membrane filters

9.29	Plant monitored and alarmed for integrity	-3
9,30	Plant monitored for integrity but not alarmed	0
9.31	Plant not monitored for integrity	10
9.32	Particle counter used continuously to monitor filter performance	-5

Rapid Gravity and Pressure Filter Works Performance

This item only applies to treatment works with rapid gravity or pressure filters. Final water turbidity is a good indicator of filter performance. Filter condition, particularly loss of filter media and cracking of filter bed, the effect of filter backwashing on final water turbidity, and filter maintenance are also relevant. The total score for item 10 is the sum of the scores for items 10.1 **or** 10.2, 10.3 **or** 10.4, 10.5, 10.6 and 10.7.

Item No.	**Risk Factor**	**Score**
10.1	Final water turbidity increases by more than 50%, excluding normal backwash period	4
10.2	Treated water turbidity increases by less than 50%, excluding normal backwash period	0
10.3	Media loss from any filter has brought media depth below design level	6
10.4	Media depth above minimum design level with audit trail maintained	-2
10.5	Signs of media cracking on any filter	4

10.6	All filters have been drained, inspected and any necessary remedial action taken within last year	-2
10.7	Air scour and backwash maintained and operating efficiently as per maintenance manual	-2

Treatment Works Operation

When a treatment works is operated in accordance with good practice with quality assured procedures, the risk from *Cryptosporidium* is reduced, particularly when there are auditable action plans to deal with any deviations from expected quality. The methods of returning filters to service following backwashing (following skimming and cleaning in the case of slow sand filters) and dealing with filter backwash water have an effect on the risk. Other relevant factors are significant short-term variations in flow through the works and whether the works has operated above its design flow.The total score for item 11 is the sum of the scores from items 11.1 **or** 11.2, 11.3 **or** 11.4, 11.5 **or** 11.6 (if relevant), 11.7 **or** 11.8 **or** 11.9 (if relevant), 11.10 **or** 11.11 (if relevant), 11.12 **or** 11.13 and 11.14 **or** 11.15.

11.1	Process control manuals specific to works available	-1
11.2	Process control manuals specific to works not available	1
11.3	Auditable action plans available for dealing with deviations in quality	-1
11.4	Auditable action plans not available for dealing with deviations in quality	1
11.5	Slow start facility on filters operational	-4
11.6	No slow start facility on filters, or slow start facility not operational	4
11.7	Filters run to waste for appropriate period after backwash	-6
11.8	Filters run to head of works for a period following backwash	-4
11.9	Filters not run to waste or head of works for a period following backwash	4
11,10	Backwash water and/or sludge supernatant has to be recycled	2
11.11	Other disposal route available for backwash water and sludge supernatant	-2
11.12	Water flow through works when operating has not varied by >10% in <30 minutes in last 12 months	-2
11.13	Water flow through works when operating has varied by >10% in <30 minutes in last 12 months	2
11.14	Flow through works above design flow for >10% of time in last 12 months	4
11.15	Flow through works above design flow for ≤10% of time in last 12 months	0

Surface Water Treatment and Supply Risk Score

The surface water treatment and supply risk score is the sum of the scores for items 8, 9 (if relevant and for the relevant treatment process), 10 (if relevant) and 11.

Final Weighted Surface Water Risk Assessment Score

The final surface water risk assessment score is the sum of the surface water

catchment risk score and the surface water treatment and supply risk score. This score is then weighted according to the population served by the supply. The population weighting factor is 0.4 x log10 (population served by the supply). The final weighted surface water risk assessment score is the final surface water risk assessment score x the population weighting factor.

WATER SUPPLY RISK CLASSIFICATION

The classification depends on the final risk assessment score. It should be noted that the high risk assessment classification used by the Scottish Executive has been renamed very high risk and the moderate risk classification split into two classifications – high risk and moderate risk.

Water Supply Risk Classification	Final Risk Assessment Score
Very high risk	>100
High risk	76-100
Moderate risk	50-75
Low risk	<50

SECTION G – PROGRAMME OF IMPROVEMENTS

- **This section not applicable**